

CASE REPORT

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Cutaneous Current Marks Due to a Stun Gun Injury

ABSTRACT: Histological changes of the skin following electrical injury with a stun gun have rarely been described. We report the case of a 61-year-old man who died after having been tortured with a stun gun during a robbery. At autopsy two reddish, dot-like lesions were found on the chest and histological examination revealed electric current-related changes. Only a few reports concerning micromorphological cutaneous changes following stun gun injury have been reported; therefore further investigations concerning the frequency and type of histological findings due to stun gun injuries will be necessary in order to provide sufficient characteristic data for a conclusive interpretation.

KEYWORDS: forensic science, current mark, electrocution, forensic histopathology, stun gun, Taser

Stun guns are self-defense devices, which generate an electric current between pointed electrodes to deliver an electric shock. Whether a fatal electric shock can be caused by stun guns is controversial, but there are reports on their use in cases of torture. Little is known about the micromorphological alterations of the skin caused by stun gun injuries.

We report a case in which the histological examination of the victim's skin revealed current-like alterations caused by the use of a stun gun.

Case report

A 61-year-old handicapped man was the victim of a robbery in his apartment where he was assaulted by a 28-year-old man. The perpetrator's demand for money was refused and the victim was locked up in a small store-room while the robber searched the apartment for money. The search was unsuccessful and the old man was then beaten and tortured with a stun gun and threatened with a pistol. The stun gun had been stolen a few days before the crime ("Paralyser Military," Parafed Co., which delivers 120,000 V, Fig. 1) and was later found near the scene. A neighbor called emergency services after hearing the victim's cries for help. On arrival of the police, the perpetrator had already left the scene, having taken all the money from the victim's wallet (approximately \$150). The victim was pronounced dead at the scene. The use of a stun gun was later admitted by the perpetrator.

Autopsy Findings

Due to occlusive atherosclerosis, bilateral below-the-knee amputation had been performed some years previously. There was se-

vere atherosclerosis of the coronary arteries, and several scarred, as well as recent ischemic infarcts of the myocardium. Other findings in the heart were aortic valvular stenosis, left ventricular hypertrophy (total heart weight 740 g) and right ventricular dilatation and hypertrophy. Additional findings were chronic congestion of the internal organs, chronic bronchitis and emphysema of the lungs. Several haematomas and superficial skin abrasions were found as consequences of blunt force trauma to the head. At the right upper half of the chest, two reddish dot-like skin lesions were found, 0.3 cm in diameter and 2 cm apart (Fig. 2). Based on the autopsy findings, the cause of death was considered to be left cardiac failure caused by recent myocardial infarction.

Histological examination of one of the dot-like skin lesions revealed loss of the epidermis in the central region. The nuclei of the epidermal cells in the peripheral parts of the lesion showed a near-horizontal elongation (Fig. 3). The subepidermal tissue showed eosinophilic homogenization and early neutrophilic inflammation; PTAH staining revealed small amounts of fibrin in this region. The histological examination of the second lesion revealed a superficial abrasion of the epidermis.

Discussion

Applications of and injuries due to stun guns and Tasers have been the subject of several reports in the forensic as well as the clinical literature (1–4). The danger of the application of electric shock weapons to the human body has been controversially discussed in the forensic literature. The application of an electric shock to the arms or legs has not been considered life threatening, but when applied to the thoracic region close to the heart, it is thought to cause cardiac arrhythmia, especially in persons with severe pre-existing heart disease (5). These theoretical considerations were supported by experimental investigations on anaesthetized pigs, in which the application of stun-gun-generated electric shocks to the left upper half of the chest resulted in periods of arrhythmia, premature ven-

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FIG. 1—Stun gun as used in the presented case (“Paralyser Military,” Parafed Co.).



FIG. 2—Reddish dot-like skin lesions at the right upper half of the chest.

tricular beats and heart block with atrial fibrillation (6). These findings led the authors to the conclusion that electric shocks from stun guns applied to the region of the heart might be fatal.

In contrast, an analysis of 16 fatalities following after the use of Tasers by the police provided some information in humans. The Taser is a hand-held electronic immobilization gun which fires darts that deliver an electrical charge to the targeted body. These authors concluded that the Taser-generated electric shock was a contributing factor in only one of the deaths (7); it should be noted that the authors did not report the body regions involved in these cases.

The extent of the contribution of stun gun use to death in the case presented here could not be answered with certainty. However, torturing the victim with the stun gun likely promoted the cardiac decompensation and contributed to the death of the victim in the sense of a “psycho-physiological” influence (8). The perpetrator was sentenced to 10 years for theft with fatal consequences (according to German law).

At present, the frequency of histologic findings due to the use of stun guns is not known and there are only a few other published observations of the micromorphological or histologic changes of the skin following stun gun injuries (9–12).

Banaschak et al. (9) reported experimental data obtained by applying different types of stun guns to isolated pig skin; no histological changes were found. Ikeda et al. (10) reported a small study on micromorphological changes of the skin after the use of a stun gun (MRT 502R, 60,000 V) on the skin of anaesthetized pigs and on pig skin during the early postmortem interval. Changes similar

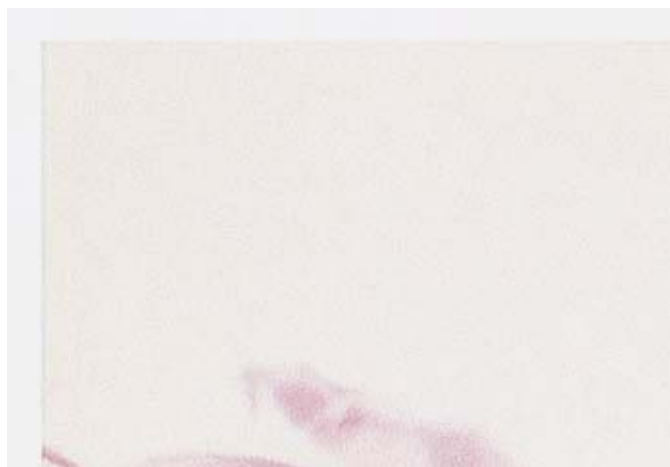


FIG. 3—Histology of the lesion seen in Fig. 2, showing nuclear elongation of the epidermal cells, eosinophilic homogenization of the subepidermal tissue, and early neutrophilic infiltration (H&E staining).

to those in our case were only detectable after pre-mortem usage. Furthermore, the authors concluded from their experiments that even macroscopic skin changes are only likely to occur in living individuals. These findings were confirmed by Seta et al. (11) in which the use of a stun gun on anaesthetized pigs produced changes comparable to those in the case presented here. The quantity of the histological changes intensified with the duration of stun gun application. Karlsmark et al. (12) reported collagen calcification to occur 2–4 days after treatment of pig skin with electrical energy. In our case, histological examination of the reddish dot-like skin lesions on the chest revealed a fishbone or streaming-like pattern of the elongated epidermal nuclei and coagulative changes of the subepidermal tissue, representing changes similar to current marks (Fig. 3).

These findings are in agreement with the experimental data gained from the application of stun guns to the skin of living pigs (10,11). To the best of our knowledge, this is the first report of histological skin changes caused by a stun gun in a human victim. In a previously described case (10), the authors focused on the macro-morphological changes but did not describe the microscopic alterations. Small reddish skin lesions which are only a few centimeters apart should raise suspicion of stun gun use as an etiology and histological investigations should be initiated. Finding histological features such as those described here may be supportive of ante-mortem stun gun use as an etiology. Further research and experimental investigation of the histological changes following stun gun injuries will be helpful in more clearly describing the macroscopic and microscopic features of stun gun injury.

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