

CASE REPORT

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Stun Gun Injuries in the Abuse and Death of a Seven-Month-Old Infant

ABSTRACT: The author autopsied a seven-month-old infant who was shocked repeatedly with a stun gun by his foster mother, in an attempt by the foster mother to get the infant to stop crying. The stun gun injuries were round, well-circumscribed, erythematous macular lesions, which were found in pairs. The lesions were 2 in. apart, and were found to match the distance between the electrodes of the stun gun found in the foster mother's purse. Based on the electrical output of the stun gun, the small size of the infant, location of stun gun discharge, and the decreased resistance of the infant's skin, it can be concluded that the stun gun injury is responsible for the infant's death.

KEYWORDS: forensic science, stun gun injuries, stun gun homicide, stun gun deaths, electrocution, infant homicide

Stun guns are readily available self-defense weapons, which have steadily increased in popularity since their introduction in the 1980s (1). Despite the limited research in the safety of these devices, they remain widely available with unregulated sales (1). Popularization of stun guns has also led to an increase in their criminal use. There are rare documented cases of rapists having used stun guns to subdue victims, organized crime have used them as torture devices, and parents have used them as punishment (2,3).

This report discusses the first documented fatality in an infant from a stun gun. Although police use of stun guns have led to several fatalities in adults, cardiac myopathies and drug use were contributing factors in these cases, and the stun gun could not be targeted as the sole cause of death in these cases (1,4). In this report there are no significant contributing factors surrounding the death of the infant involved, showing the stun gun to be ultimately responsible.

Case History

The deceased, a neglected, malnourished, seven-month-old infant, was found in his crib, unresponsive and not breathing. The death scene was unremarkable, with the exception of three bottles of partially empty over the counter cough and cold medications. Upon initial questioning, the foster mother caring for the infant stated "I gave him too much cough medication," explaining that the infant had been running a fever and was irritable. However, further questioning led the foster mother to move for her purse, which officers quickly confiscated, revealing it to contain a stun gun. Additional questioning and autopsy findings showed the foster mother

used the stun gun on the infant as a means to stop the infant's crying. The foster mother was charged and found guilty of involuntary manslaughter, aggravated battery of a child, and child endangerment, and is serving time for this crime.

Autopsy Findings

On external examination, the seven-month-old decedent was 26 in. in length and 12½ lb in weight. The decedent's height was below the fifth percentile for his age, and was that of an average five-month-old; in addition, his weight was that of an average two and a half-month-old. Abdomen, genitals, and inner thighs showed areas of marked erythema from diaper rash. Areas in the back of the head showed loss of scalp hair and folliculitis. Seven erythematous well-circumscribed macular lesions 0.1 in. in diameter were observed. Two of these paired lesions were present on the right upper chest near the end of the collarbone. Another set of paired lesions were found towards the center of the chest just above the sternum, and one discreet lesion was found on the right distal thumb pad (Fig. 1). The 2-in. distance between the erythematous macules on the right upper chest (Fig. 2) matched the distance between the contact electrodes on the stun gun (Figs. 3 and 4).

Systemic review of internal organs was unremarkable. Toxicological screening of blood, bile, and gastric contents revealed a blood level of diphenhydramine to be 3.3 mg/L, and of pseudoephedrine to be 2.9 mg/L. Although the levels of these active ingredients in over the counter cough syrup exceed therapeutic levels, they all were far below toxic or fatal doses, which are 16 mg/L and 19 mg/L for diphenhydramine and pseudoephedrine respectively (5).

Stun-Gun Study

The stun gun, which was found within the foster mother's purse, was an Advanced Space Thunder manufactured by the S.K. Elec-

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tronic Corporation in Korea. There were two sets of electrodes protruding from the stun gun, the outer pair pointed directly forward, were 0.2 in. in length and were separated by a distance of 2 in. (Fig. 4). The inner set of electrodes are set closer together and point towards each other, these are 0.35 in. in length and separated by a distance of 0.8 in. The stun guns' electrical output is approximately 70,000 V, an equivalent of 1.12 joules.



FIG. 1—Erythematous well-circumscribed macular lesion with a diameter of 0.1 in., corresponding to the diameter of the stun gun electrode.

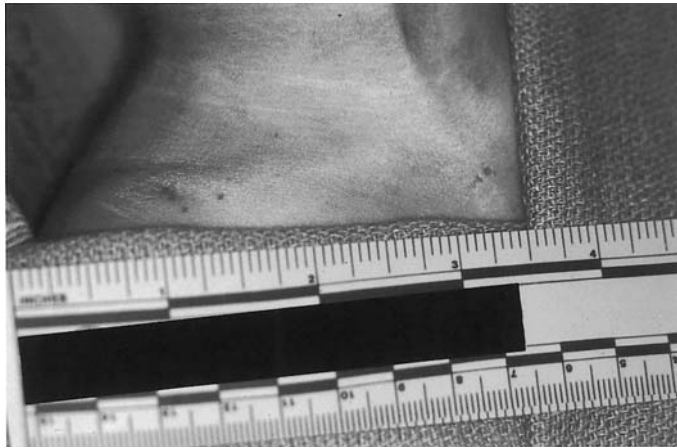


FIG. 2—Multiple pairs of erythematous macules separated by a distance of 2 in.

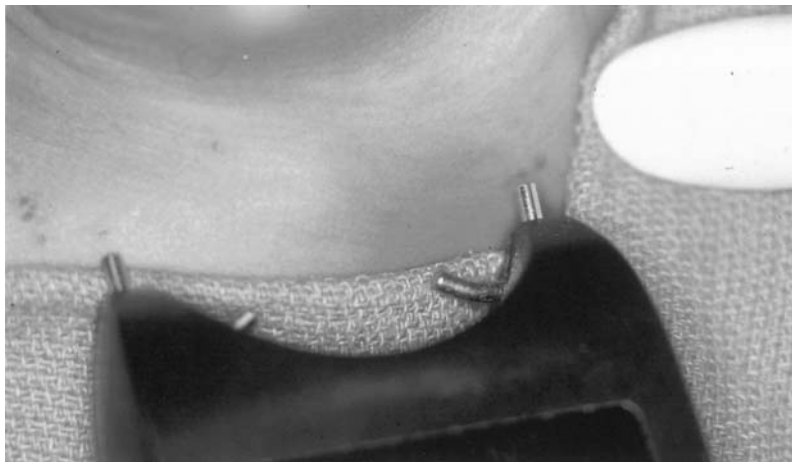


FIG. 3—The distance between the erythematous lesions matches the distance between the contact electrodes of the stun gun.

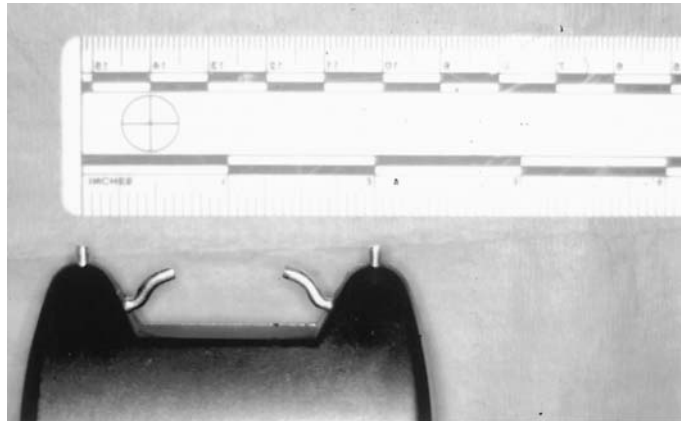


FIG. 4—The distance between the contact electrodes of the stun gun measures 2 in.

Previous studies by N. Ikeda et al. used pigs, showing that erythematous circular lesions could only be produced if the stun gun was used antemortem (3). If the stun gun was discharged into the pigs postmortem, no erythematous lesions would result (3).

Microscopic examination of skin from erythematous circular lesions on chest and thumb show changes consistent with an electrical burn, similar to those described in previous reports on stun gun injury (3). Sections showed areas of denuded epithelium, focal streaming of nuclei, and congestion in the dermis. Damaged keratinocytes showed hyperchromatic nuclei with acute inflammation and necrosis present at the dermal-epidermal junction.

An extensive literature search on the effects of high voltages and stun guns on infants and pediatrics was performed. However, the data for humans belonging to this age group is extremely limited, yielding only the guidelines for the use of Automated External Defibrillators (6).

Discussion

There have been some deaths reported which have involved the use of stun guns. These cases involved police subdual of victims under the influence of illicit drugs such as PCP, which may have been significant contributing factors in the cause of death (1,4,7). In addition, offensive non-lethal uses of stun guns, such as instruments of torture in organized crime and instruments of punishment used by parents, have been documented (2,3). Although the manu-

facturer's recommendations for the safe use of this stun gun do not explicitly state that it should not be used on children, they advise owners to "keep the device secure, not allowing children to play with it." This report is the first to discuss a stun gun induced fatality in an infant.

Before discussing the specificity of this case, a brief discussion on stun guns and tasers is appropriate for clarification. Stun guns and tasers are often confused; both result in the discharge of an electrical current in the victim, causing confusion, disorientation, loss of balance, and loss of muscle control. However, stun guns are smaller hand held weapons, which are used in close contact with the victim. When the prongs of the stun gun are brought into contact with the victim's body, the voltage is discharged. Tasers are larger than stun guns, and resemble a hand held firearm. Tasers fire two darts, which are attached to approximately 15 ft of wire. The voltage is discharged from the taser, travels along the wires, and causes the victim to lose all neuromuscular control. Therefore, tasers differ from stun guns in their projectile nature, and are used over distances rather than close contact.

External examination of the infant revealed signs of neglect (diaper rash, folliculitis, decreased height and weight) as well as seven erythematous well-circumscribed lesions. Previous studies, as well as a study performed by this author, show that the well-circumscribed erythematous paired lesions are the result of stun gun injury, but were also inflicted antemortem (2,3). Autopsy revealed no presence of disease.

These findings implicate the use of a stun gun as the cause of death of the involved infant; additional considerations including stun gun electrical output, locations on the infant where stun gun was discharged, decreased resistance of the infant's skin, as well as the small size of the infant, all support the theory that the stun is responsible for the infant's death and that stun guns are, in fact, dangerous weapons. Effects of electrical output on pediatric patients is extremely limited, yielding only the Guidelines for Automated External Defibrillator (AED) use in this age group. These guidelines do not recommend the use of AED's in children less than 8 years of age (6). These guidelines also state that energy doses should not exceed the monophasic dose of 2 to 4 J/kg (6). Although the infant involved in this case weighs 5.6 kg, and the output of the stun gun is 1.12 joules, stun guns are not monophasic, delivering a series of impulses greater than the relative refractory period, rendering skeletal muscle functionless (4). In addition, it is documented that increased discharge time into the victim results in increased incapacitation and damage (4,8). Animal studies show extreme variability in susceptibility to the harmful effects of shock, noting that a lethal dose in one animal may produce no detectable change in 12% of the other animals tested (9). If the discharge time of the stun gun into the infant was 3–5 s, from these guidelines and studies, it is feasible to conclude that the stun gun's effects are dangerous and potentially lethal. In addition, the main limiting factor in the amount of energy delivered by a stun gun is the resistance of the skin contacted (1,4). In this case, the infant was noted to have a fever the evening of his death, and was likely to have been perspiring. The moisture of the infant's perspiration would have decreased the resistance when the electrodes were applied to his skin, allowing for an increased voltage to be delivered. Also, the stun gun was discharged on the skin superficial to the brachial plexus. The directions of the stun gun list this as one of the specific locations to discharge the weapon for maximum effectiveness (Fig. 5). The decreased resistance of nerves, as well as their concentration in the brachial plexus serves to increase the electrical output to and incapacitation of the central nervous system (4). One of the major considerations is the reduced size and mass of the

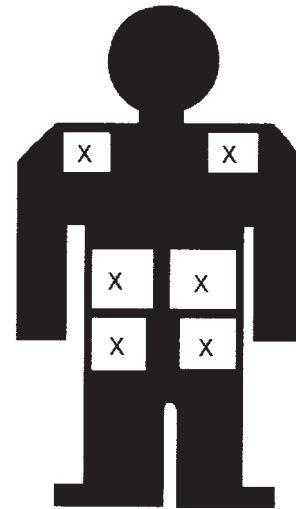


FIG. 5—Illustration from stun gun instructions showing where to discharge on victim for maximum effectiveness.

infant compared with an adult on which all stun gun studies and degrees of incapacitation have been determined. When considering the smaller size of the infant as well as the increased proximity of its heart to the brachial plexus in the infant, it is logical to conclude that the infant heart will receive a greater electrical output when discharged at this location than will an adult heart. A report on stun guns and their effects on the human body states that ventricular fibrillation is a definite possibility if only a few microamps reach the heart for a prolonged period (4).

The findings discussed in this case report support the conclusion that a stun gun was in fact the cause of death of the involved infant.

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