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RESEARCH ARTICLE

LIGHTENING STROKE RESULTING INTO LICHTENBERG'S FLOWER: A RARE CASE REPORT

Dr. Rahul Kaushik[1], Dr. Prafulla Kumar[1], Dr. Kuldeep Kumar[2], Dr. Priti Singh[1] and Dr. Luv Sharma[3]

1. Resident, Department of Forensic Medicine and Toxicology, Pt B.D. Sharma PGIMS, Rohtak, Haryana, India 124001.
2. Associate Professor, Department of Forensic Medicine and Toxicology, Pt B.D. Sharma PGIMS, Rohtak, Haryana, India 124001.
3. Professor, Department of Forensic Medicine and Toxicology, Pt B.D. Sharma PGIMS, Rohtak, Haryana, India 124001.

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Abstract

Background:Occupational hazards are consequences and risks associated with particular occupation. Farmers working in the fields are at various risks like snake bite, injuries sustained from agricultural equipment, inhalation of pesticides, electrocution and lightening injuries. In a thunderstorm and rainy season,person working in an open area and that too in a farm, is at utmost risk of getting electrocuted from lightening injury due to less insulation to the electric current in the wet surrounding. Metallic heavy agricultural machineries, irrigated fields and lack of awareness are other factors that makes one prone to get stroked by a lightening arc.

Case History: Atwenty-three-year-old male farmer was found dead while working in the fields of rice in the afternoon. As per the family he went for cultivating seedlings of rice plants in the fields full of water. He was taken to the emergency department of our facility where he was declared brought dead after initial examination and resuscitation. The body was sent for medicolegal examination in the Mortuary. On external examination, mud was present over the body and clothes at places, the lower and underwear were torn at places.Characteristic arborescent patterned burns to lighteningi.e., Filigree burn were found over the left lateral aspect of lower abdomen and anterior aspect of upper two third of left thigh.

Conclusion: Meticulous examination and sceptical eye of autopsy surgeon, meteorological department report, reconstruction of events and findings over the body can converge upto the cause and manner of death.

Introduction:-

Voltage is the fundamental force or pressure that causes electricity to flow through a conductor and is measured in volts. Resistance is anything that impedes the flow of electricity through a conductor and is measured in ohms. Current is the flow of electrons from a source of voltage through a conductor and is measured in amperes. There can be various sources of electricity that can electrocute a person. A flash or bolt of lightning is due to an electrical

Corresponding Author:- Dr. Rahul Kaushik
Address:- Resident, Department of Forensic Medicine and Toxicology, Pt B.D. Sharma PGIMS, Rohtak, Haryana, India 124001. Email: draarkay1503@gmail.com

discharge from a cloud to the earth. The electric current is direct with a potential of about twenty thousand amperes and about one hundred to thousand million volts or more. Along the track of the current much energy is liberated, most of which is converted into light. A single flash of lightning stroke lasts about 1/1000 of a second, due to which no burns or only minor burns and singeing of hair may be seen. It is attracted by the highest points. It passes normally along the outside of a conductor, and as such, persons in buildings are relatively safe from electrocution. Dry skin and dry clothes are bad conductors, whereas wet skin and wet clothes are good conductors. Lightning or atmospheric electricity differs from ordinary electric current only in degree. The effects are seen in an area about 30 metres in diameter.[1] It is well known that injury from lightning is capricious and unpredictable. Two people can stand side by side during a flash and one may be mutilated and killed while the other is unharmed. The physical damage in fatal cases can vary from virtually nil to gross burning, fractures and tissue destruction. Cutaneous marks may be present, the wellknown 'fern-like' or 'arboresque' pattern, also referred to as 'Lichtenberg' figures being much less common than the standard texts suggest. Irregular red marks, often linear first-degree burns, may follow skin creases, especially if damp from sweating. These marks may be many inches long and generally follow the long axis of the body towards the ground. Frank blistered or charred burns are also present in some cases.[2]

Case Report:

The deceased was found collapsed in the fieldsand was taken to the emergency of facility where he was declared brought dead after initial examination and resuscitation. The body was sent for medicolegal examination in the Mortuary. On external examination, mud was present over the body and clothes at places, the lower and underwear were torn at places with evidence of blackish and burnt edges of multiple defects over them. The body was of well built adult male wearing a green coloured sports lower and underwear which were torn at places with evidence of blackish burnt off edges(Figure 2). The length of body was 178 cm and rigor mortis was present all over the body in developed phase. The following injuries were noted on external examination of body:

1. Reddish brown colourediscolouration in branching pattern arising from the upper anterior aspect of right thigh going in three directions i.e, downwards, medially and laterally towards middle one third of thigh suggestive of arborescent burns (Figure 1)
2. Superficial black charred area of burn of size 10 x 4 cm was present over the middle one third of anterior aspect of left thigh surrounded by reddish discolouration and vital reaction. On dissection, the floor of wound was pale, hard and pinpoint reddish spots were seen suggestive of ends of coagulated blood vessels. (Figure 1)
3. Superficial burns were present over the lateral aspect of left upper thigh in its upper one third region which are extending upwards upto the left lateral aspect of lower abdomen over an area of size 32 x 10 cm. The burnt area was irregular and in patches with interrupted blackish discolouration and peeling of epidermis alongwith reddish discolouration. The hairs were singed in vicinity. Characteristic arborescent patterned burns due to lightening i.e., Filigree burn were found over the body as escribed above.(Figure3 and 4)

The cause of death after conduction of autopsy was given as Lightening injury described and its complications. Cardiac rhythm irregularity persisted due to lightening was the complication

Discussion:-

Lightning is a transfer of electrical charge resulting from the sudden environmental discharge of static electricity sandwiched between an upper negative-charged region, such as thunderheads, and a lower positive area.[3] Lightning strikes are unique compared with other electricity-related injuries in that the duration of current is much shorter, but the intensity and voltage are much higher. There are marked differences between injuries caused by high-voltage electrical accidents and lightning. Lightning strikes are instantaneous, typically causing superficial burns, while high-voltage electrical injuries normally last seconds longer and cause deeper burns and massive internal thermal injury. Burn injuries sustained from high-voltage electrical accidents may require amputation or extensive fasciotomies. Pronounced myoglobin release may lead to acute renal failure. Conversely, the vast majority of lightening injuries are indirect, making serious burns and deep injury uncommon. However, lightning strikes do frequently cause life-threatening injuries to cardiac and neurologic systems.[4]

The stroke of light injuries are of various types, some of them are mentioned in table no 1.[5]

Types of lightning strike and ways they affect the human body.

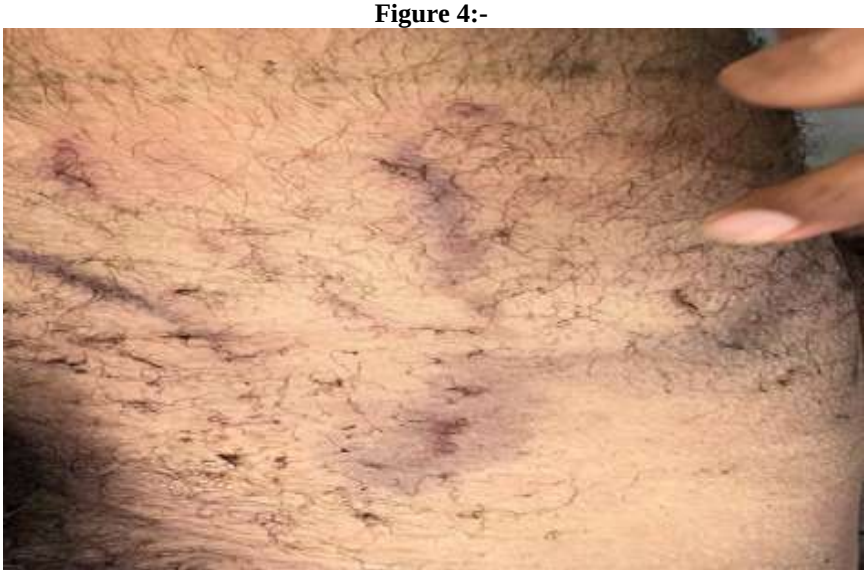
Type	Mechanism
Direct strike	Most of the current flows through the body; highest mortality
Contact voltage	Occurs when lightning strikes an object such as a car or metal pole that the victim is touching
Side flash	Splashing of current from a nearby object or person onto the victim
Ground current	Ground current passes from the strike point through the ground into the victim
Upward streamer	Passage of lightning from the victim upwards
Blast injury	Sudden expansive explosion of the air around the lightning channel causing blunt trauma

Figure 1:-

Figure 2:-

Figure 3:-

Figure 4:-



Conclusion and Summary: -

The characteristic arborescent pattern burn injuries resulted due to lightening stroke is an instantaneous process. However, proper awareness to the at-risk occupations and availability of treatment facility can decrease the fatality rate.

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