

Accidental high voltage electrocution causing abdominal wall blow out bowel evisceration: An unusual presentation

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Received: 29 Nov 2020; Received in revised form: 18 Jan 2020; Accepted: 15 Feb 2021; Available online: 12 Mar 2021

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Abstract— *Electricity is the backbone for modern industrialization, development and day to day needs. Electrical Injuries are among the most devastating of burn injuries. High voltage electrical injuries result in extensive deep tissue damage and are associated with multiple complications, long term morbidity and a high mortality rate. The passage of electric current when passes through the body, it produces wide range effects, varying from insignificant localised spasm, little or no contact burns, fatality with little or no burns or extreme severe burning. We describe the case of a 35-year-old male driver who suffered high voltage electric injury of anterior abdominal wall and left upper limb due to accidental contact with high tension wire. This paper also emphasizes the safety measures to be taken at work place pertaining to high voltage cable.*

Keywords— *electric joule burn, abdominal blowout, High Voltage Cable, safety.*

I. INTRODUCTION

Males are predominantly affected among electric burn cases, reflecting the occupational exposure to electric hazard. Tissue damage is determined by intensity of voltage and current, duration of contact, resistance of tissue, area of contact, and pathway of flow through the body until the point of exit of current. The energy generated at entry and exit point results in tissue vaporization, especially, at the exit site due to the resistance of the tissue to the exiting current. This resulted in an outward orientation of the tissue by this explosive force of the current leaving the body causes a blow out of the exit point and in case of abdomen causing evisceration of bowel. Blood vessels and nerves are the good conductor of electricity in human body. ^[1]

Electric fatalities are usually accidental in nature ^[2]. In developing countries like India, high tension wires pass by very near to the sides of homes and high-rise buildings. These lead to many cases of accidental electrocution. The entry point of electricity is usually the upper extremities with resultant exit through the lower extremities. The exit point through the abdominal wall

with resultant abdominal wall loss is rare. Here, we are describing a case of abdominal wall blow out following high voltage electric current to upper extremity, a rare phenomenon. ^[3]

High voltages (more than 1000 volts) may cause victim to be thrown to the ground causing fatal head injuries due to fall.

II. CASE REPORT

A 35 years old male presented to casualty after the high voltage electrocution incidence happened while he was handling goods on roof top of bus and high-tension electric line was passing nearby the roof top of bus. A joule burn found at left hand web space in between index and middle finger[figure1] and a lacerated wound over right parietal region of head[figure4]. A flame burn patch found at right arm and hand[figure2].

On examination patient was disoriented and had blood pressure 100/68 mm of Hg and pulse rate was 108/min. An initial conservative management with fluids

undertaken but patient succumbs before he could be taken to operation theatre for surgery.

Autopsy examination revealed an oval shaped shallow crater 1.5 to 2 cm in diameter with scorched margins and ridge of broken skin around the whole of the circumference overlying the crater, suggestive of entry wound which was present over web space between index and middle finger of left hand. The exit point through umbilical region of anterior abdominal wall resulting in a wound of size 9 x 7 cm through which small intestine and

omentum was visible [figure3] with multiple perforations in small bowel seen, margins of wound were scorched, elevated and everted. Patient had flame burn injuries over right arm and dorsum of right hand which occurs due to ignition of victim's clothing. On dissection of head there was underlying fracture of right parietal bone. Petechial hemorrhages were seen in the white matter of the brain and over the endocardium of the heart. Cause of death in this case was opined as death due to electrocution



III. DISCUSSION

By convention, electric injuries or joule burn are classified into two group low tension and high-tension injuries (1000 volt is the dividing line) [1] Electric injuries are of three types:

1. Entry and exit wounds-entry point is the point of contact which is charred, depressed which may be

blistered by vaporization of water from the tissues. Whereas the exit point usually circumscribed, dry, and may have outward orientation due to explosive force of current leaving the body.

2. Arc burns-an arc is an external flow of current from a contact point as it jumps to a ground point usually

associated with alternating current producing muscular contracture.

3. Flame burns-it occurs due to ignition of the victims clothing of surroundings by heat generated by the electric current.

The most common points of entry are upper extremity, with an exit point usually through the lower extremity. The electric current after the skin is penetrated usually flow along the path of least resistance not necessarily between the entry and exit wound.^{[2][3]}

In this case, patient sustained high tension electric injury which flows through the left upper limb resulting in abdominal wall blow out involving full thickness at exit point over the anterior lower abdomen.

Abdomen is usually not affected as it has a greater cross-sectional area and low resistance to electricity. All these factors may dissipate the energy of electricity, thus making an abdominal blow-out due to electrocution a rare phenomenon.^[4]

A detailed history of the incident revealed that the victim who was throwing good articles from roof of bus and a high-tension electric line (25 KV) was passing nearby the roof top of bus. while throwing goods; goods came into contact with the high-tension wire and subsequently current flows in victim from his left hand and it dissipates from the anterior abdominal wall which was touching the metallic part of roof top of bus by the time of incidence.

The distance between high tension power line and the roof top of bus in the present case, was less than 2 meter which was further being reduced by negligent and ignoring act of victim while throwing the goods.

Present case is an accidental electrocution, encountered when an individual ignores the presence of high voltage cables when he is engaged in some activity near the cable.^[5]

Similar profile case also reported by Jha Ashesh et Al^[6] but in that case victim survived due to timely reporting to health care facility and enthusiastic management of victim.

IV. CONCLUSION

Present case occurred as a result of ignorance and lack of awareness of victim about electrical safety when engaged in some activity. This case warrants the need of underground electric cables or proper insulation of overhead electric wires.

Proper education and awareness of general public regarding electric safety will reduce the number of such cases.

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