

An Unusual Case Report Of Lightning Injury

¹Dr. G.Lokendranath and ²Dr. R.Prabhakar Rao

Electric potentials play an essential role in our body for every activity through nerve endings – (synapses) by chemical transmitters. Lightning injures the C.N.S and Autonomic nervous

ABSTRACT:

Electric potentials play an essential role in our body for every activity through nerve endings – (synapses) by chemical transmitters. Lightning injures the C.N.S and Autonomic nervous systems due to varied resistance in individuals, with effects of asymptomatic, burns, seizures and residual acute or chronic neuronal changes, cardiovascular and pulmonary complications. Here, we present an article highlighting the rarity of a young woman surviving without any cardiac morbidity, in spite of a lightning burn injury on chest below neck close to the heart when high intensified voltage damaged the gold necklace to residual charred scrap. Fortunately, she had only residual superficial burns on body and rupture of left tympanic membrane.

Key-words: Lightning, Burn, Injury

Corresponding Author: **Dr. G.Lokendranath M.D.**

Assistant Professor of Medicine, Santhiram Medical College, Nandyal, Kurnool District (A.P.)

Email – glnath2012@gmail.com

INTRODUCTION:

Man claims tall before trees by felling (deforestation) and expanding empire of concrete jungles. Hence, thunder, lightning strikes unusually. Lightning involves high voltage injury, Organ damage may often happen without external injuries. Multisystem injuries may occur. Death may be due to cardiac asystole rather than ventricular fibrillation.^{1, 2} Lightning is one of the powerful and spectacular natural phenomena.¹ It involves transfer of electrical charges between clouds or between the clouds and ground and occurs when a difference in potential of 30,000V or higher and exceeds the inbuilt resistance of the air.² Lightning is the second leading cause of weather-related death after floods.⁴⁻⁶ The risk of being struck by lightning is dependent on regional, seasonal and temporal factors.^{5,7}

Lightning strikes person either by–Ground strike, side flash from nearby objects (30%) of injuries, upward streamer strike (¼ of injuries) below upwards), Direct strike - most dangerous of all disrupts CNS function (5%) Contact strike -least common (1-2%). Electric injury due to lightning (100 million to 2 billion Voltages, 2 Lac amperes)

may be benign- without any damage (Individual variation). In some people it may result skin burns- Lichenberg figures (resulted by rupture of small capillaries under the skin), flowers which last for hours to days helps the clinician to opine over the cause. The Electromagnetic potentials can result in loss of consciousness/cardiac arrest. Heat injury (28000° Celsius= 50000° F in fraction of second- 5 times more than Sun heat) due to lightning can melt or carbonize large objects. Lung damage can occur directly or by heated air expansion. Burns –Deep burns are rare. Epidermal and Dermal burns occur by metal contact- Coin, jewellery, Belt buckles, hairpin etc. Heat and prolonged contact result in linear burn like rain water running down the body, punctuate burns (like Cigarette burns), Fern like burns, Thermal burns by contact metal. Concussive injuries by explosive shock wave may result auditory injury by closeness, expansion of fluid volume disrupt ear drum rupture, cataract formation. Long term effects like memory loss, sleep disturbance, chronic pain, reflexes sympathetic dystrophy, giddiness may persist, paralysis, paraplegia and cerebral bleeds.

CASE STUDY:

This 30 year old Mrs. S. was struck by lightening in field while working at 5.00 pm three days ago in the middle of month May. She fell unconscious for about one hour and got up on her own by showers of rain and went home herself. She had complaints of extreme weakness of whole body, headache, constant dimness and ringing in ears on awakening, which persisted. She had burns at the nape of the neck (Photograph-1) with hair burnt up and pain below neck where she wore a gold necklace (Photograph-2) and also in both thigh regions with superficial burn. (Photograph-3) On physical examination multiparous female, conscious, mentally alert, vital signs stable. No cranial nerve palsy. Left tympanic membrane perforated. No objective weakness of limbs. Deep tendon reflexes were sluggish. Planters, flexors and visceral reflexes were normal. No signs of increased ICT. Superficial grade 1 three day old epidermal crusted burn in necklace area. Two serpents discoloured one vertical linear superficial burn medial aspect of each thigh respectively. No bony injuries noted. On investigation CT scan brain (Photograph-4) showed narrowed ventricles and Cerebral Oedema. ECG was well within the normal limit.

DISCUSSION:

Lightening always strikes some persons / metal wearers attract easily is a myth



Photograph-1 Showing burn injury in the area of necklace

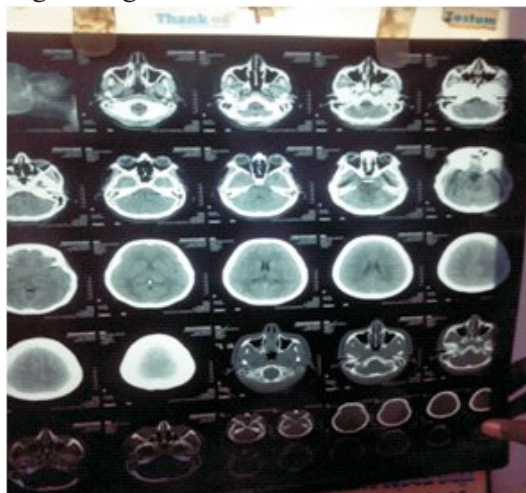


Photograph-2 Showing burn in nape of neck and hair



Photograph-3 Burns over both thighs

Lightening variably traverses an individual / metal object – ornament, vessel, umbrella etc as conductor to reach the ground. Lightening is a cosmic direct current neither AC /DC lasts for 100th to 1000th fraction of second, this short duration explain minimal external or internal burn injury. Lightening



Photograph-4 CT Scan Brain

with or without rain is anvil lightening i.e. bolt from the blue. People engaged in outdoor activity, golfing, fishing, swimming, boating, camping or hiking and field work are at risk. Vasospasm of small vessels of nerves may occur, results in weakness of limbs; hyperadrenergic state lasts for minutes to hours known as “Kerano-paralysis”. Permanent sympathetic systemic change is rare. Tissue damage caused by electric current can ranges from transient increase in cell membrane permeability to immediate coagulation of tissue. Barotraumas due to explosive and implosive air changes around may results in head and skeletal trauma and organ injury. Reported mortality rates range from 10-30 percent, depending on the source of data. Most people who are struck by lightning live to tell the story, but many suffer from long term injury or disability.⁵ Our case escaped the brunt of lightening voltage, gold chain jeopardising for the life. Skin and hair burns only, tympanic membrane rupture and kerano-paralysis for a short while and headache due to cerebral oedema well presented.

CONCLUSION:

The patterns of clinical signs and symptoms in lightning strikes injuries are rare, are substantially different from those in common electrical accidents because extremely high voltages with brief exposure are involved, and are associated with substantial morbidity. They are therefore

challenging for the attending medical team. The nervous and cardiovascular systems are especially vulnerable to damage from lightning strike. Because lightning strikes are rare, the establishment of the understanding of their injury patterns and facilitate specific treatment

References:

1. Blount BW. Lightning Injuries, American Family Practice, 1990; 42:405-14.
2. Browne BJ, Gaasch WR. Electrical Injuries and Lightning, Emergency Clinics of North America, 1992;10:211-26.
3. Carleton SC. Cardiac Problems Associated With Electrical Injury, Cardiology Clinics, 1995; 13:263-6.
4. Fontanarosa PB. Electrical Shock and Lightning Strike, Annals of Emergency Medicine, 1993; 22:378-86.
5. Graber J, Ummenhofer W, Herion H. Lightning Accident with Eight Victims: Case Report and Brief Review of Literature, The Journal of Trauma, 1996; 40:288-90.
6. Holle RL, Lopez RE, Howard KW. Safety in the Presence of Lightning, Seminars in Neurology, 1995; 15:375-79.
7. Krider PE. Cloud-to-Ground Lightning: Mechanisms of Damage and Methods of Protection, Seminars in Neurology, 1995;15:2227-32.
8. Buja Z, Arifi H, Hoxha E. Electrical burn injuries; an eight year review, Annals Burns Fire Disasters, 2010; 23;4-7.