Electric Shock Injuries

Electric shock injuries may be caused by lightning or *electricity* (current) passing through the body. The amount of injury depends on the current's pressure (voltage), the amount of *current* (amperage), the type of current (direct vs. alternating), the body's resistance to the current, the current's path through the body, and how long the body remains in contact with the current. Current is the flow of electricity. Electricity may produce effects ranging from barely noticeable tingling to instant death; every part of the body is vulnerable.

The harshness of injury depends mostly on the voltage. Low voltage can be as dangerous as high voltage under the right circumstances. People have been killed by shocks of just 50 volts.

WHAT DETERMINES THE EFFECTS OF ELECTRICITY?

How electric shocks affect the skin is determined by the skin's resistance. This is the skin's ability to stay unharmed by a shock. This, in turn, depends upon the wetness, dryness, thickness and or cleanliness of the skin. Thin or wet skin is much less resistant than thick or dry skin. When skin resistance is low, the current may cause little or no skin damage but may severely burn internal organs and tissues. Conversely, high skin resistance, such as with dry thick skin, can produce severe skin burns but decreases the current entering the body.

WHAT PARTS OF THE BODY DOES ELECTRICITY AFFECT THE MOST?

- The nervous system (the brain, spinal cord, and nerves) are most helpless to the effects of electricity and most often harmed in electrical injury. Some damage is minor and clears up on its own or with treatment. Sometimes the damage is severe and will be permanent. Neurological problems may be apparent immediately after the accident, or gradually develop over a period of up to three years.
- Damage to the respiratory and cardiovascular systems happens immediately. Electric shocks can paralyze the respiratory system (stop breathing) or disrupt heart action (cause the heart to beat irregularly or stop). This may cause instant death. Smaller veins and arteries, which get hot more easily than the larger blood vessels, are at greater risk. They can develop blood clots. Damage to the smaller vessels is a common cause of amputation following high-voltage injuries.
- Other injuries may include cataracts, kidney failure, and injury to muscle tissue. An electric arc may set clothing and flammable substances on fire which may cause burns. Strong shocks are often accompanied by violent muscle spasms that can break and dislocate bones. These spasms can also freeze the victim in place and prevent him or her from breaking away from the current.

DIAGNOSIS

Diagnosis relies on information about the cause of the accident, physical examination, and close monitoring of the heart, lungs, neurological condition and kidney activity. These conditions can change rapidly so close observation is necessary. Magnetic resonance imaging (MRI) may be necessary to check for brain injury.

TREATMENT

- When an electrical accident happens at home or in the workplace, emergency medical help should be summoned as quickly as possible. The main power should immediately be shut off. If that cannot be done, and current is still flowing through the victim, stand on a dry, non-conducting surface such as a folded newspaper, flattened cardboard carton, or plastic or rubber mat. Use a non-conducting object such as a wooden broomstick (never a damp or metallic object) to push the victim away from the source of the current. Non-conducting means the substance will not pass electricity easily through it. Do not touch the victim or electrical source while the current is still flowing. This may electrocute the rescuer.
- If the victim is faint, pale, or showing signs of shock, lay the victim down, with the legs elevated above the level of the chest. Warm the person with a blanket.
- If a pulse can not be felt, or the person is not breathing, someone trained in cardiopulmonary resuscitation (CPR) should begin CPR. Continue this until help arrives.
- If the victim is burned, remove clothing that comes off easily. Rinse the burned area in cool water for pain

relief. Give first aid for burns. Burns often require treatment at a burn center.
- Electrical injury can be associated with explosions or falls that can cause other injuries. Avoid moving the head or neck if an injury to this area is suspected.
- Give first aid as needed for other wounds or fractures.
- Fluid replacement therapy is necessary to restore lost fluids and electrolytes. Severely injured tissue is repaired surgically.
- Antibiotics and antibacterial creams are used to prevent infection.
- Kidney failure may need to be treated.
- Physical therapy may help recovery along with counseling if there is disfigurement.

PROGNOSIS

- Electric shocks may cause death.
- Survivors may require amputation. Cosmetic problems may result along with disfigurement.
- Injuries from household appliances and other low-voltage sources are less likely to produce extreme damage.

PREVENTION

- Know electrical dangers in your home.
- Damaged electric appliances, wiring, cords, and plugs should be repaired or replaced. Electrical repairs should be attempted only by people with the proper training.
- Hair dryers, radios, and other electric appliances should never be used in the bathroom or anywhere else they might accidentally come in contact with water. Water and pipes create a ground and the electricity picks the easiest way to go to ground which can be through your body.
- Young children need to be kept away from electric appliances and should be taught about the dangers of electricity as soon as they are old enough.
- Electric outlets require safety covers in homes with young children.
- During lightning and thunder storms, go indoors immediately, even if no rain is falling. Boaters should return to shore as rapidly as possible.
- If the hair on your head or arms stands on end during a storm, seek cover as rapidly as possible as a lightning strike may be about to happen.
- If you cannot reach indoor shelter, stay away from metallic objects such as golf clubs or fishing rods and lie down in low-ground areas. Standing or lying under or next to tall or metallic structures is unsafe. For example, it is unsafe to stand under a tree during a lightning storm. Do not stand next to long conductors of electricity such as wire fences.
- An automobile is appropriate cover, as long as the radio is off.
- Telephones, computers, hair dryers, and other appliances that can act as channels for lightning should not be used during a thunder storm.
- During storms, stay away from screens and metal that may conduct electricity from the outside.

SEEK IMMEDIATE MEDICAL ATTENTION IF:

- You develop chest pain
- A part of your arms or legs becomes very swollen or painful.
- One of your arms or legs appears pale, cool, or discolored.
- Your urine becomes discolored, or you are not urinating as much as usual.
- You develop severe abdominal pain.

Document Released: 12/20/2004 Document Re-Released: 03/16/2010
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