CONDITION

Electrical injury

An electrical injury is damage caused when electrical current or lightning affects the body.

WHAT IT IS
Tissue damage caused by electrical current or lightning

BODY SYSTEM
Skin, heart and circulation, muscles, and nervous system

MAIN SYMPTOMS
Burns, pain, tingling or weakness, abnormal heartbeat

WHAT CAUSES IT
Contact with electricity, electrical arcs, or lightning

HOW IT IS DIAGNOSED
Exposure history, examination, ECG, and targeted blood tests

MAIN TREATMENT
First aid, monitoring, burn care, and injury-specific treatment

CAN IT BE CURED?
Sometimes - many injuries heal, but lasting damage can remain

IS IT AN EMERGENCY?
Sometimes - fainting, chest symptoms, burns, or high-voltage exposure

LONG-TERM OUTLOOK
Minor injuries often heal; severe injuries may cause disability

Overview

An electrical injury happens when electricity damages the body. It may follow contact with household electricity, workplace equipment, a power line, an electrical arc, or lightning.

Effects range from a small skin burn to serious damage involving the heart, muscles, nerves, brain, or internal organs. The injury visible on the skin may not show how much damage has occurred underneath.

Electric current can disrupt the heart's rhythm and the signals used by nerves and muscles. It can also generate heat, causing deep burns. A strong muscle contraction may prevent someone from releasing the source or cause a fall.

An electrical arc can produce intense heat without current passing directly through the body. Lightning is a brief but extremely powerful electrical event with its own pattern of injuries.

Do not touch anyone still connected to an electrical source. Disconnect the power safely first to avoid becoming injured yourself.

Symptoms

Symptoms may begin immediately, but some nerve, muscle, or psychological effects become clearer over the following hours or days.

Possible symptoms include:

Burns may be smaller than expected. A tiny skin mark can sit over deeper muscle or nerve damage, although a brief low-energy exposure may cause no lasting injury.

Lightning may cause temporary paralysis, confusion, hearing problems, burns, or cardiac arrest, meaning the heart has stopped pumping blood effectively.

- A burn, blister, or discoloured area where electricity entered or left the body
- Muscle pain, spasms, stiffness, or weakness
- Tingling, numbness, altered sensation, or nerve pain
- A fast, slow, or irregular heartbeat
- Chest pain, shortness of breath, dizziness, or fainting
- Confusion, memory problems, headache, or a seizure
- Hearing or vision changes
- Injuries caused by being thrown, falling, or losing muscle control

Causes and risk factors

Electrical injury occurs when the body becomes part of an electrical circuit, current jumps across a gap, or heat from an electrical arc causes a burn.

The amount of harm depends on:

Wet skin has less resistance than dry skin, allowing more current to enter the body. Contact involving both hands, or a hand and foot, may allow current to cross the chest.

Alternating current, used in most homes, can cause repeated muscle contraction and make it difficult to release the source. Workplace, industrial, farm, and power-line exposures may involve much greater energy.

Risk is higher when equipment is damaged, poorly installed, used near water, or handled

without suitable training and protective equipment. Young children may be injured by outlets or cords and can develop mouth burns after biting a cord.

Lightning injuries may result from a direct strike, current travelling through the ground, contact with a struck object, or current jumping from something nearby.

- The strength and type of current
- How long contact lasts
- The path electricity takes through the body
- Whether the skin is wet or broken
- The tissues involved
- Whether the exposure causes a fall, blast, or fire

Diagnosis

Diagnosis is based on what happened, symptoms, and a physical examination. No single test detects every form of electrical damage.

A healthcare professional may ask about the source, length of contact, wet conditions, loss of consciousness, falls, and the likely path through the body. They may check the skin, muscles, nerves, circulation, hearing, and vision.

An electrocardiogram, or ECG, records the heart's electrical activity. It may be needed after chest pain, fainting, an abnormal pulse, significant burns, high-voltage contact, or a possible current path across the chest.

Blood and urine tests may look for muscle breakdown, kidney stress, or other internal injury. Severe muscle damage can release myoglobin, which may make urine dark and harm the kidneys.

Imaging may be used if a fall, blast, head injury, fracture, or internal injury is suspected. Some people need hospital monitoring. Others with a minor exposure, normal examination, and reassuring ECG may leave after assessment.

Treatment and management

First stop the exposure without putting anyone else in danger. Switch off the power at the main supply if this can be done safely. Do not approach fallen power lines or touch someone who remains connected to electricity. Contact emergency services and the electricity

provider.

Once the source is disconnected, check whether the person responds and is breathing normally. Emergency call handlers can guide cardiopulmonary resuscitation, or CPR. Use an automated external defibrillator, or AED, if available.

Treatment depends on the injuries found and may include:

A tetanus vaccination may be offered for a burn or open wound if vaccination is not up to date.

Deep electrical burns may need assessment by a burn service even when the surface area is small. Damage can become more obvious over time, so wounds may need repeated review.

Do not put ice, butter, creams, or adhesive dressings on an electrical burn before assessment. If advised by emergency services, loosely cover a cooled burn with a clean, non-fluffy dressing.

- Heart monitoring and treatment of an abnormal rhythm
- Cleaning, dressing, and specialist care for burns
- Fluids for extensive burns or muscle damage
- Pain relief and wound care
- Surgery to remove damaged tissue or relieve dangerous swelling
- Treatment for fractures, head injuries, or other trauma
- Physical, occupational, or psychological rehabilitation

Complications

Heart rhythm problems are an important early concern. Serious rhythm changes usually occur around the time of exposure, particularly after severe injury, although monitoring may be needed when symptoms or risk factors are present.

Deep muscle injury can cause swelling inside a tight layer of tissue, called compartment syndrome. This can reduce blood flow and damage nerves and muscles unless treated quickly.

Other possible complications include:

Electrical mouth burns in children need careful follow-up. Delayed bleeding can occur if healing tissue separates from a damaged blood vessel.

- Infection or slow burn healing
- Permanent scarring or reduced joint movement
- Lasting weakness, numbness, nerve pain, or balance problems

- Kidney injury from severe muscle breakdown
- Cataracts or other eye damage, particularly after lightning
- Hearing loss or ringing in the ears
- Memory, concentration, sleep, or mood difficulties
- Disability after brain, spinal cord, limb, or internal injury

Prevention

Use qualified professionals for electrical installation and repair. Replace damaged plugs, cords, and appliances. Keep electrical devices away from water and never handle them with wet hands.

Safety switches, also called residual-current devices or ground-fault circuit interrupters, quickly cut power when they detect an unsafe current path. They reduce risk but do not make unsafe electrical use harmless.

Use outlet covers and keep cords out of young children's reach. Follow workplace lockout procedures, safety distances, training requirements, and protective-equipment rules.

During thunderstorms, move into a substantial building or a hard-topped enclosed vehicle. Avoid open ground, isolated trees, water, metal fences, and wired electrical equipment until the storm has passed.

Living with it and what to expect

A brief, low-energy exposure with no burn, concerning symptoms, or abnormal findings may leave no lasting effects. Mild skin soreness or muscle pain may improve over several days.

Burns and deeper injuries can take weeks or months to heal. Dressings, surgery, scar care, and rehabilitation may be needed. Physical or occupational therapy can help restore strength, movement, coordination, and everyday skills.

Nerve symptoms do not always follow the same timeline as skin healing. Tingling, weakness, pain, headaches, sleep problems, or difficulty concentrating may continue or become noticeable later. Report new or worsening symptoms during follow-up.

Severe injuries may require long-term support for mobility, work, self-care, or chronic pain. Anxiety, low mood, distressing memories, or fear around electricity or storms can also occur, and psychological support may help.

Follow-up may include wound checks, burn-clinic visits, rehabilitation, or review of nerve and muscle symptoms. Outlook depends mainly on the location and extent of damage, associated injuries, and progress during recovery.

When to get medical help

Call emergency services immediately if someone:

Do not approach until the source has been disconnected or emergency personnel say it is safe. A person struck by lightning does not retain an electrical charge and can be touched once the surroundings are safe.

Prompt medical assessment is also appropriate after loss of consciousness, a burn around the mouth, pregnancy during exposure, or current that may have crossed the chest. Seek urgent care for increasing swelling, worsening pain, dark or reduced urine, new weakness, spreading redness, fever, or bleeding from an electrical mouth burn.

For a minor shock without symptoms or visible injury, contact a healthcare service or urgent-care advice line for guidance based on the source and circumstances. Seek urgent help if concerning symptoms develop.

- Is still in contact with an electrical source
- Is unresponsive, not breathing normally, or has collapsed
- Has chest pain, breathing difficulty, a seizure, or an abnormal heartbeat
- Has significant burns, severe pain, confusion, or weakness
- Has touched a power line or high-voltage equipment
- Has been struck by lightning
- Has fallen from a height or may have a head, neck, or back injury

Common questions

Can a small electric shock damage my heart?

It is possible, but risk varies. Chest symptoms, fainting, an irregular pulse, high-voltage contact, or current crossing the chest increase concern. An ECG can check the heart's electrical activity.

Can I have an internal injury without a large burn?

Yes. The skin may show only a small mark even when current has affected deeper muscle,

nerves, or blood vessels. Pain, weakness, numbness, swelling, dark urine, or reduced movement should be assessed.

Do delayed heart problems happen after an electric shock?

Serious rhythm problems usually occur during or soon after exposure. Delayed problems are uncommon after a minor injury with a normal assessment and ECG. Follow discharge advice and seek urgent help for later chest pain, fainting, breathlessness, or palpitations.

Should every electrical burn be checked?

Electrical burns should receive medical assessment because their depth can be difficult to judge. Burns involving high voltage, lightning, the face, hands, feet, genitals, or a major joint may need specialist care.

How long do tingling and nerve pain last?

Mild symptoms may settle over days or weeks, but deeper nerve injuries can last longer. New, persistent, or worsening numbness, weakness, balance problems, or burning pain should be reviewed. Rehabilitation and pain-management services may help.

Is a person struck by lightning still electrically charged?

No. Once the environment is safe, the person can be touched and given first aid. Call emergency services, check breathing, and begin CPR or use an AED if directed and available.

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