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Management of **Electric Shock**

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Introduction

An electric shock occurs when electricity flows across a potential gradient from high to low concentrations. It is a physiological reaction caused by electric current passing through the body. If death occurs as a result, this is known as electrocution.

Most injuries are caused through direct contact with low voltage domestic circuits such as direct contact with wall sockets, or contact with electrical cords or sockets. Often the electricity is conducted through metal keys, tools, pins or cutlery. The resulting injuries usually do not need extensive treatment. However, some individuals (e.g. miners, electricians and construction workers) can die from electrocution mainly through work related injuries.

The effects of electric shock

Injuries to the human body caused by contact with electricity range from small skin burns to life threatening internal organ damage. Injuries are classed into:

- Direct effect to the cells causing cell death and organ damage (e.g. fibrillations and arrhythmias).
- Thermal injury due to conversion of electricity into heat leading to burns.

The severity of a shock and hence any of the injuries it causes is dependent on skin resistance. This resistance is reduced by moisture so that wet skin can change a relatively minor injury with superficial tissue damage to life threatening shock with extensive internal damage.

A secondary effect of an electric shock is the trauma which can result from falling due to the reaction from the shock.

The clinical effects of electric shock include the following:

- Cardiac effects are the most common and also the most serious. These are usually seen as arrhythmias (abnormal heart rate, usually rapid), slowing of the heart rate and heart muscle injury resulting in non-specific Electrocardiogram (ECG) changes.
- Respiratory arrest where the diaphragm is paralysed and the individual unable to breathe.
- Skin burns where the extent is dependent on the amount of energy delivered and the duration of contact. Extensive burns can lead to infection and dehydration due to loss of the skin barrier.
- Neurological damage resulting in impaired recall, loss of sensation in limbs, spinal cord injury, paralysis and loss of consciousness.
- Formation of blood clots.
- Kidney damage and/or failure.
- Musculoskeletal injury such as muscle damage, rhabdomyolysis and compartment syndrome.

Manage someone after an electric shock

- TURN OFF THE CURRENT SOURCE (if safe to do so) to prevent further damage.
- Pull the victim away from the source of shock if it is safe to do so.
- Perform basic life support, if needed.
- Check clinical signs to assess effects of the electric current on the patient's body.
- Determine the path of the current through the body (locate and entry and exit point) to check which organs are most likely to be affected.
- Determine the voltage the individual has received (low voltages are below 1000V and high voltages are over 1000V)

Individuals with loss of consciousness or high voltage injury need to be admitted straight to hospital. All pregnant women in this situation need to be admitted to the obstetrics unit. If there are extensive burns, then the victim needs to be admitted to a burns unit.

Usually low voltage injuries without loss of consciousness or initial cardiac arrest are generally monitored for a period of 24 hours. If there are no abnormal findings after this time, it is unlikely that any significant injury has been sustained.

References and Further Reading

1. Electricity at Work HSG85 (Third edition) http://www.hse.gov.uk/pubns/books/hsg85.htm

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