PATIENT CARE THEORY 2

UNIT 2, PART 4: Electrical Burns

Marilyn Niffin BSc, ACP
Professor Georgian College
Winter 2021

chewed on an electrical cord

Electrical Burns - management

- Safety first!!!
  - Establish a safety zone
  - Turn off power (if applicable) *allied resources
  - Energized lines can act as a whip

Burns - Electrical

- **DEPTH AND EXTENT OF THE BURN IS UNSEEN**
- determine amperage/voltage & mechanism of injury
- e.g. electrical outlets vs high tension wires
  - AC = risk of VF
- Both AC and DC current can be lethal
  - However it takes more DC current to have the same effect as AC current
- treat all electrical incidents **seriously!** Even when the patient states they feel fine.
- Severity will depend on the path the current takes

Definitions

- Joule –the SI unit of work or energy, equal to the work done by a force of one newton when its point of application moves one meter in the direction of action of the force, It is also the energy dissipated as heat when an electric current of one ampere passes through a resistance of one ohm for one second.
- Voltage - difference in electric potential between two points; is what causes current to flow. ; the pressure from an electrical circuit's power source that pushes charged electrons (current) through a conducting loop,
- Amperage - the strength of an electric current – this is what determines lethality
- Ohm - is the electrical unit of resistance

Amperage

- a milliampere (mA) is one-thousandth of an ampere or amp. A standard household circuit that supplies your outlets and switches carries 15 or 20 amps (15,000 or 20,000 mA).
- 1 to 10 mA: Little or no electrical shock is felt.
- 10 to 20 mA: Painful shock, but muscle control is not lost.
- 20 to 75 mA: Serious shock, including a painful jolt and loss of muscle control; the victim cannot let go of wire or another source of shock.
- 75 to 100 mA: Ventricular fibrillation (uncoordinated twitching of ventricles) of the heart can occur.
- 100-200 mA: Ventricular fibrillation occurs, often resulting in death.
- Over 200 mA: Severe burns and severe muscle contractions occur. Internal organs can be damaged. The heart can stop due to chest muscles applying pressure to the heart, but this clamping effect can prevent ventricular fibrillation, greatly improving the chances of survival if the victim is removed from the electrical circuit.

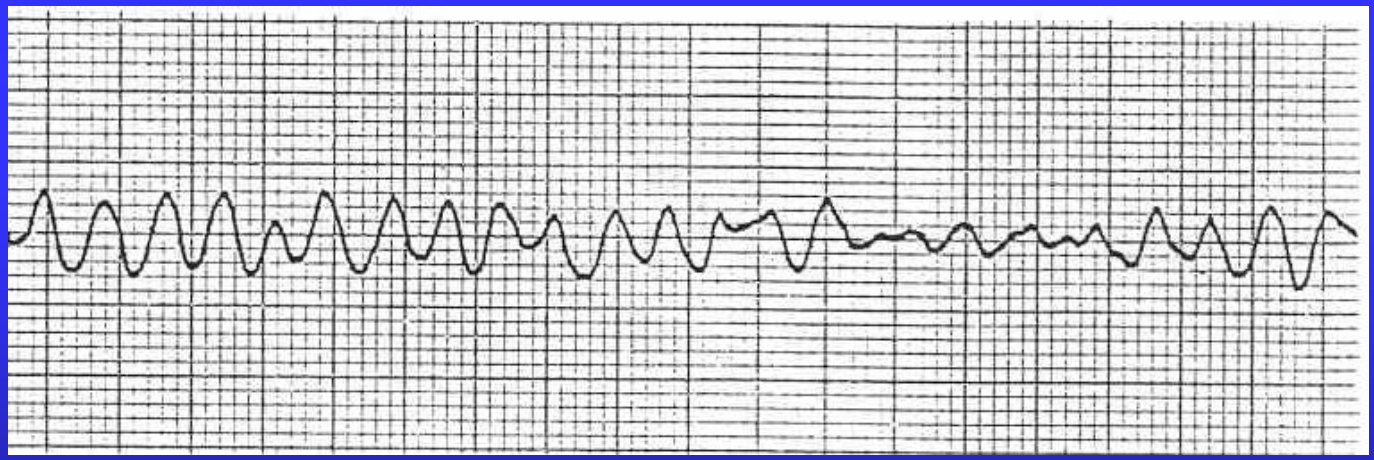
Amperage vs. Voltage: The Dangers of Electrical Shock (thespruce.com)

Electrical Burns - Management

- Assess Patient
  - ABC's + immobilization (PRN)
  - Look for entrance and exit wounds
  - Remove clothing and jewelry
  - Assess for trauma – much of the damage can be internal (trauma and burns)
  - Treat like a standard burn (thermal, irrigation, cover)
  - ECG monitoring

Burns - Electrical

- remember VF?



Burns - Electrical

High Voltage (> 1,000 volts)

- High tension wires → look for entrance & exit wounds
- Current seeks the past of least resistance (blood, nerves)
- likened to crush injuries – damages muscle
- damaged muscle releases myoglobin and potassium
- life threatening arrhythmias from hyperkalemia
- renal failure from myoglobinurea
- Bone resists electrical current but consequently retains the most heat → “can literally cook the limb from the inside out”

Burns - Electrical

Electrical flash burns

- are pure thermal burns
- typically involve face and hands
- mechanism: electrician sticks tool in a connection box and causes a short circuit arc and flash
- resulting flash burns face & hands and may set clothing on fire
- severe flash burns can cause enough swelling & jeopardize the airway

Burns - Electrical

Lightening strike is DC

- **REVERSE TRIAGE PRINCIPLES APPLY**
- Focus on the VSA patients – i.e. those who are alive are likely to stay alive
- ROSC may occur without any intervention or – patient may re-arrest from respiratory arrest secondary to chest wall rigidity
- asystole may be reversed with just CPR.
- flash burns are common

Burns - Electrical

Remember asystole?

Questions?