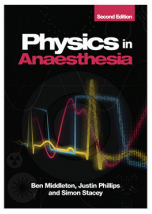
Chapter 20

Electrical shocks and safety



Self-assessment questions

These questions and answers, in both MTF and SBA formats, accompany *Physics in Anaesthesia 2e* and link back to the book for guidance.

Multiple true / false questions

For each of the following questions, mark all answers as either true or false

1. When an anaesthetized patient is exposed to an electric current:

a. The presence of a pacing wire can reduce the risk of shock

b. A current of 15 mA could cause visible and sustained muscular contraction

c. They are less vulnerable to electric shocks because they are connected to many pieces of electronic monitoring equipment

d. Intravenous fluids can increase the risk of shock as they act as conductors

e. The sensation of electric shocks is increased

Did you know?

- In 153 AD Scribonius Largus, a Roman physician, had his patients stand on torpedo fish in sea water to manage the pain from their gout.
- It is true that electric currents can have local analgesic properties as well as the potential of narcosing patients.

2. Regarding the risk of ventricular fibrillation from electric currents:

a. A micro-shock received at the end of the P-wave is the most vulnerable time in the cardiac cycle

b. A micro-shock of 50 μA is the minimum current that can cause ventricular fibrillation

c. A current of 100 mA through a patient's finger could cause ventricular fibrillation

d. Type BF leakage classified devices are not suitable for connections to the heart

e. Type CF leakage classified devices are suitable for indirect connection with the heart

Pointer

- See *Tables 20.1* and *20.2*.

3. Regarding diathermy:

a. The current density at the diathermy plate is much lower than at the probe tip

b. The high frequency of the alternating current increases risk of sensation in nerves and muscles

c. It is unsuitable for patients with implantable insulin pumps

d. Bipolar diathermy has more powerful thermal effects than unipolar diathermy

e. Short bursts of current are better for coagulation

Pointer

- Implants include more than just pacemakers and defibrillators, for example, implantable insulin pumps, sacral nerve stimulators, cochlear implants and metal stents.
- They should all be considered high risk for unipolar diathermy.

Single best answer questions

For each of the following questions, select the single best answer – note that more than one answer may be true but only one option represents the best answer

1. In which circumstances would a patient receive a shock from touching the live casing of a faulty metal appliance?

a. Appliance earthed, patient touching an earthed bed
b. Appliance fused, patient touching an earthed bed
c. Appliance not earthed, patient touching an earthed bed
d. Appliance earthed, patient not touching an earthed bed
e. Appliance earthed, patient standing barefoot on wet floor

Pointer

- Think of the electric shock 'sandwich'.

2. Capacitance coupling explains which phenomenon:

a. Ventricular fibrillation from a current leaking from a pacing wire
b. A lightning conductor carrying electric charge from the top of a building to earth
c. Macro-shock
d. Micro-shock
e. Current leakage through the dielectric material encasing an alternating current

Pointer

- Capacitance is explained further in *Section 21.1*.

3. What is static electricity?

a. The unintended flow of small but dangerous currents directly, or within close proximity, to the heart
b. The common return path for electric current in an electric circuit
c. The tingling sensation when you touch a faulty wire
d. The potential difference generated between dissimilar surfaces when they are rubbed together
e. A result of friction

Did you know?

- In the 'Dust bowl' of the 1930s a lot of static electricity was able to build up between the ground and thick airborne dust.
- Electric charges erupted into blue flames on metal fences and electrical systems in cars were shorted out.
- There were even cases of people being rendered unconscious – an example of electronarcosis!

Answers to questions for Chapter 20 – Electrical shocks and safety

Multiple true / false questions

The following answers are true:

1. b and d

2. b, c, d and e

3. a and e

Single best answer questions

The options below represent the single best answer, although other options may also be true:

1. c

2. e

3. d