Asst. Lec. Mohammed Tareq Fakhri
mohammed.tareq@mustaqbal-college.edu.iq
TA: Sukaina Gassan Kareem
Sukaina.gassan@mustaqbal-college.edu.iq

Experiment No.5

Electrosurgery UNITS (ESU'S)

Objectives:

- **Describe the principles and modalities of electrosurgery**
- **Discuss the risks involved in the use of electrosurgery**
- **Give an understanding of the terms used in connection with electrosurgery**

Electrosurgery equipment Consist of:

- **The electrodes.**
- **The foot switch.**
- **Generator.**

Theory:

Electrocautery is the cautery of tissues accomplished by the application of heat that is generated by the passage of an electrical current through metal. Electrical current is converted to different wave forms of energy that can cut or coagulate tissue. Tissue is denatured by this process, but not burned. In most devices, the energy passes through an active operative electrode, through tissue and then returned to the unit through a passive electrode or plate (some manufacturers call the plate, "the antenna" because the energy form for some units is at the level of radiowaves).

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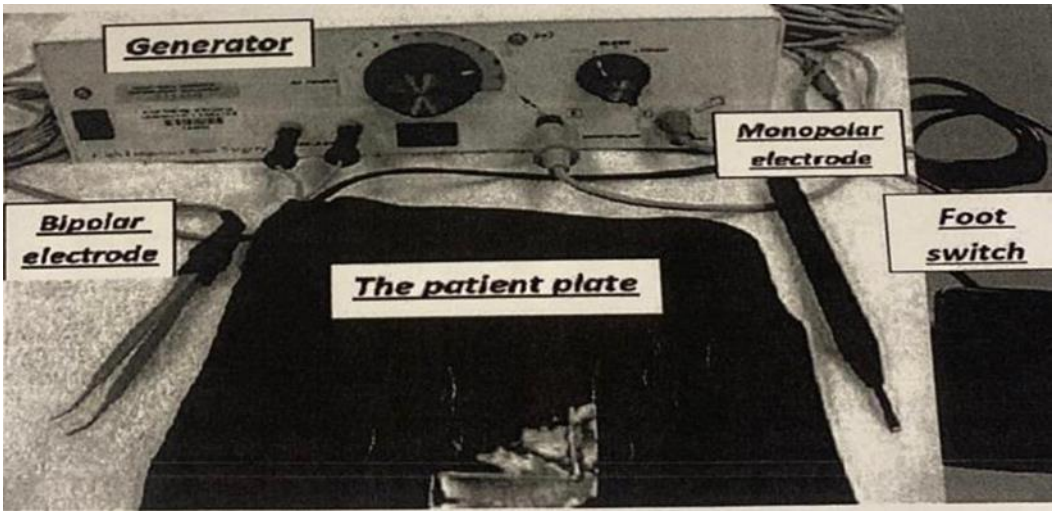


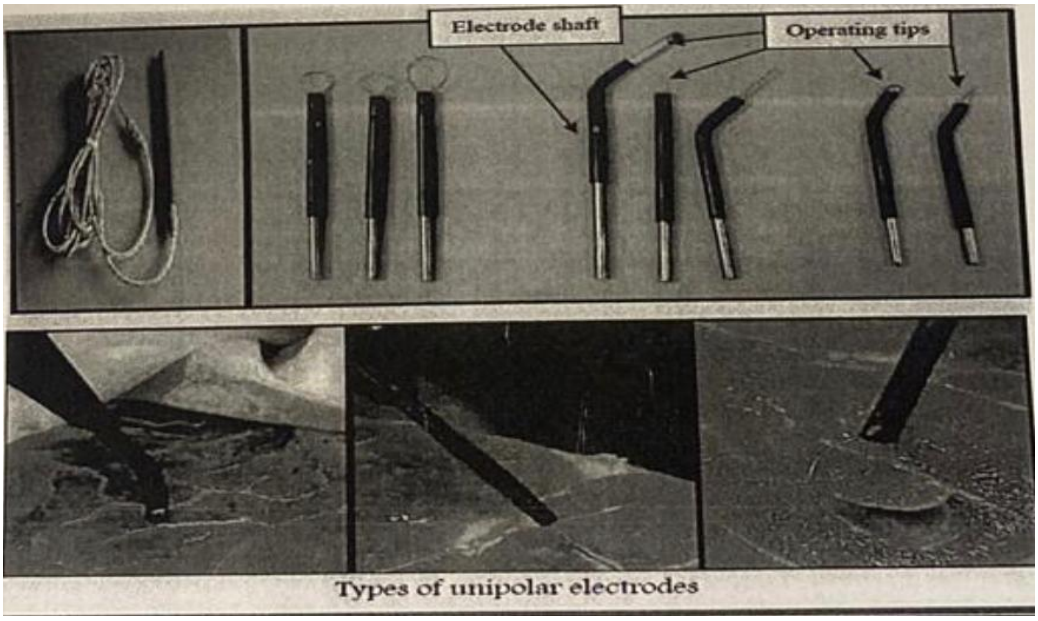
Components of the machine:

1. Electrodes perform incision, excisions, and coagulation depending on the type of electrode and the setting at which it is used. Electrode tips are made of metal and come in various sizes and shapes that are interchangeable in a surgicalhand. The operating tip and the very end of the electrode is exposed metal while the main part of the electrode shaft is covered with an insulating material.

Electrode types and purposes:

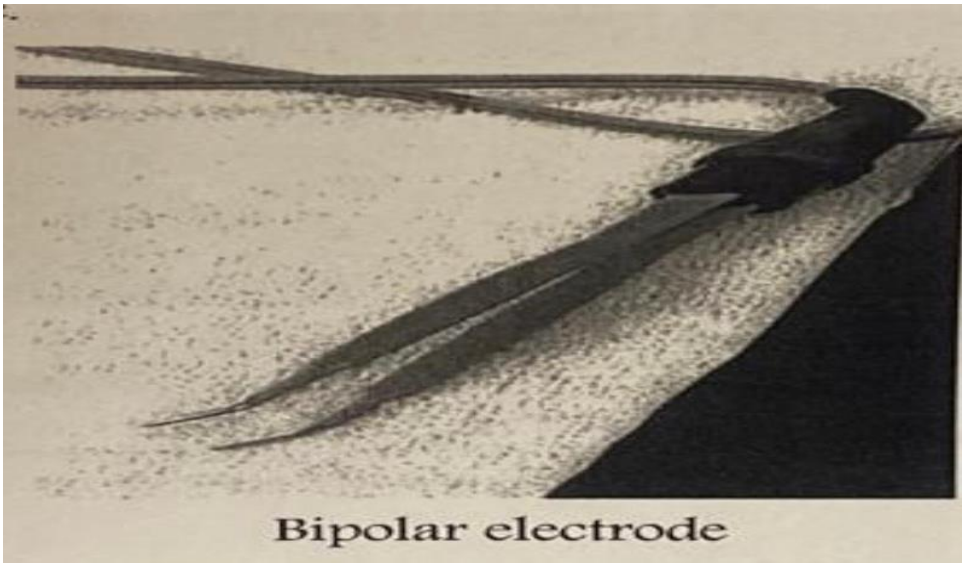
There are 2 basic types of electrodes, bipolar and unipolar.

- ✓ Unipolar electrodes have one end that contacts the tissue. The energy flows from the end of the electrode into the tissue to the patient plate (dispersive electrode) or "antenna". Unipolar electrodes come in many shapes and sizes and are chosen based on the desired task to be performed.



Types of unipolar electrodes

- ✓ Bipolar electrodes have two separate ends that contact the tissue, and the energy flows from one end of the electrode through the tissue to the other end of the same electrode, instead of to the grounding plate.


Bipolar electrode

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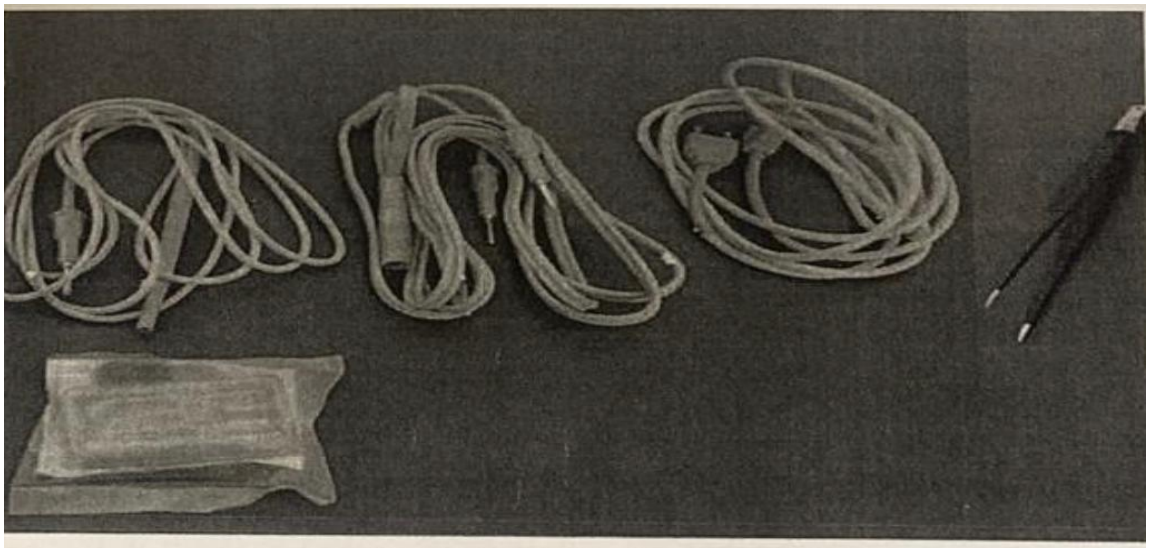
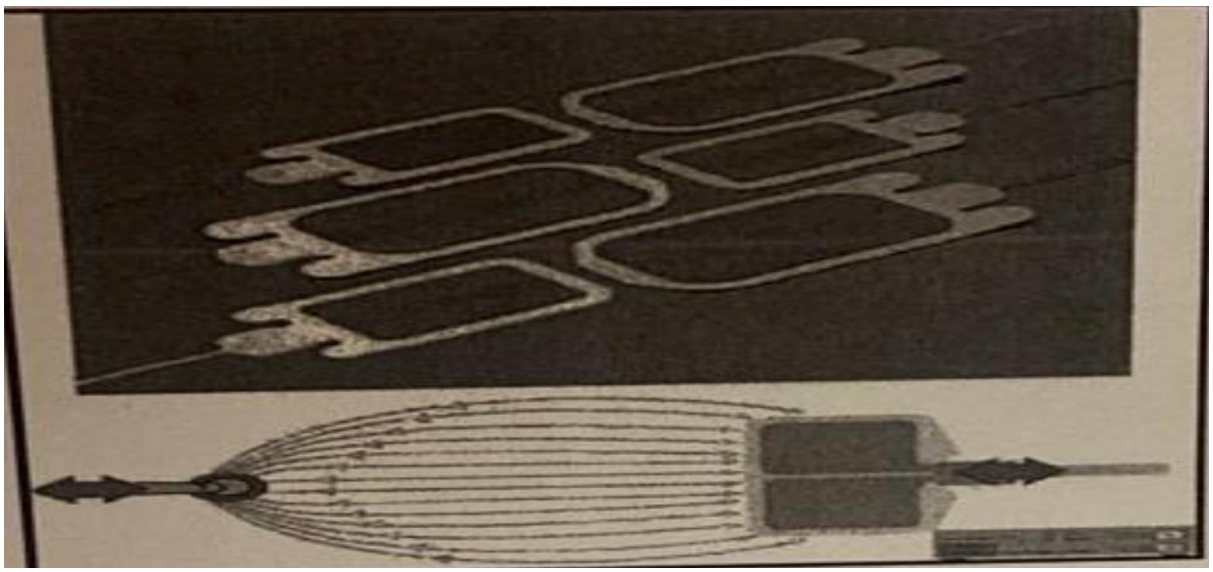
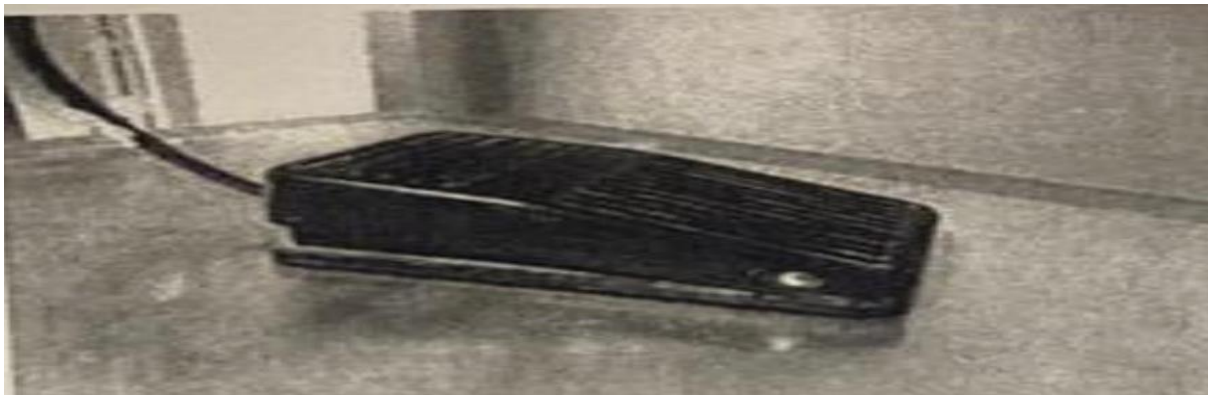


Cautery electrodes set

- ✓ The dispersive electrode (the patient plate) is positioned on the patient in a location remote from the surgical site and is relatively large in surface area, a design that serves to defocus or disperse the current thereby preventing tissue injury.



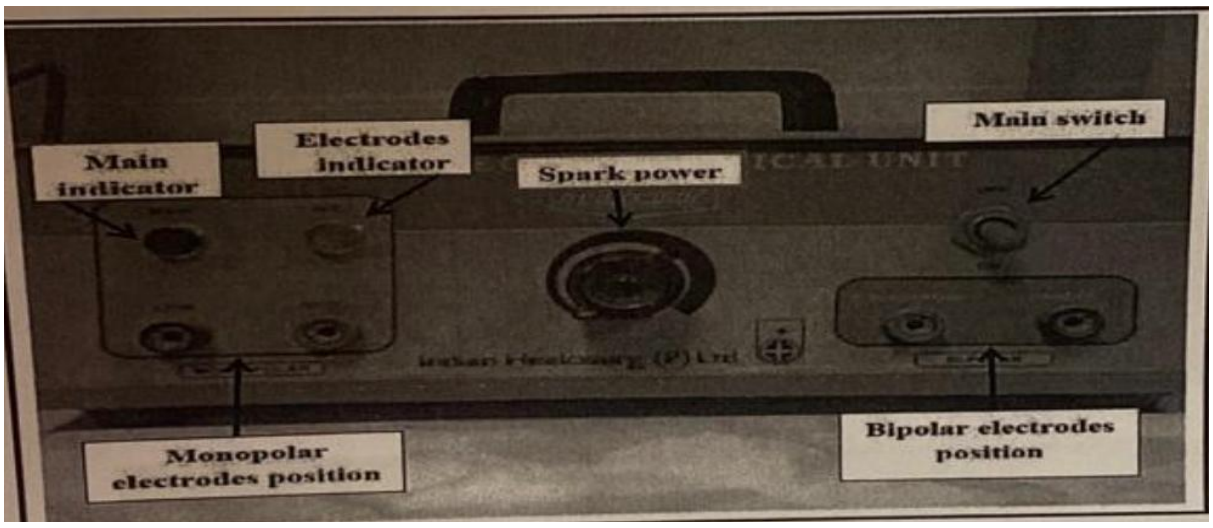
2. The foot switch: switch ON and OFF the electrosurgical action.



3. The generator:

✓ Generator frontal view

Here is a close up of the instrument panel of an electrosurgery machine. There are settings for the power, electrodes positions indicators, and main switch.



- ✓ Generator components.

1. High voltage transformer.
2. Electric spark gap (SG).
3. L/C circuit.

The transformer will increase the voltage from 220V to 3000 4000V which is able to ionize the air in the gap between the two points of the tungsten. When the gap starts to spark during production of electric arc by alternating pattern, it will produce current with radio frequencies which start to oscillate in the circuit L/C and then deliver to the electrodes.

Discussion:

1) What is the purpose of electrosurgery?
2) What are the different types of current used in electrosurgery?
3) How does an electrosurgical unit work?
4) What is the frequency of electrosurgery?