Archives of Clinical and Experimental Surgery, 2022
VOL 11, NO. 8, PAGE 01

OPINION ARTICLE

Open Access

Use of Electrosurgery during Outpatient Treatments

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ARTICLE HISTORY
Received: 01-Aug-2022, Manuscript No. EJMACES-22-73134;
Editor assigned: 03-Aug-2022, PreQC No. EJMACES-22-73134 (PQ);
Reviewed: 19-Aug-2022, QC No. EJMACES-22-73134;
Revised: 25-Aug-2022, Manuscript No. EJMACES-22-73134 (R);
Published: 02-Sep-2022

Description

A high-frequency (radio frequency) alternating polarity electrical current is applied during electrosurgery to biological tissue in order to cut, coagulate, desiccate, or fulgurate tissue. (These concepts are employed in this methodology in certain ways). One of its advantages is that it allows for precision cutting with little blood loss. In hospital operating rooms or during outpatient treatments, electrosurgical devices are routinely utilised during surgical operations to assist prevent blood loss. An electric current heats the tissue during electrosurgical techniques. Although electrical devices that generate a hot probe may be employed in some situations to cauterise tissue, electrocautery is not the same as electrosurgery. A probe heated to a high temperature by a direct electrical current is used in electrocautery. Direct current from dry cells in a penlight-style device may be used to achieve this. In contrast, Radio Frequency (RF) alternating current is used in electrosurgery to heat the tissue through RF-induced intracellular oscillation of ionised molecules, which raises the intracellular temperature. Instantaneous cell death happens when the intracellular temperature hits 60°C. When tissue is heated between 60°C and 99°C, tissue desiccation (dehydration) and protein coagulation take place simultaneously. The intracellular contents go through a liquid to gas conversion, significant volumetric expansion, and subsequent explosive vaporisation if the intracellular temperature quickly approaches 100°C.

Desiccation and coagulation effectively used with electrosurgical forceps cause the blockage of blood vessels and stop bleeding. Although the procedure is officially an electrocoagulation procedure, the phrase "electrocautery" is occasionally used inadvertently, carelessly, and inaccurately to describe it. By linear extension, the vaporisation process can be utilised to transect or cut tissue in addition to ablate tissue targets. While relatively low voltage, continuous or almost continuous waveforms are ideal for the processes of vaporization/cutting and desiccation/coagulation, the process of fulguration is carried out using very high voltage modulated waveforms. A superficial form of coagulation is often produced by applying arcs of modulated high voltage current to tissue that is quickly desiccating and coagulating. Some people use the term "diathermy" to refer to electrosurgery, but in other instances, the term refers to dielectric heating, which is caused by molecular dipoles rotating in a high frequency electromagnetic field. The utilisation of this effect is most common in tissue ablative devices like microwave ovens, which operate at gigahertz frequencies. Almost all surgical specialties, including dermatological, gynaecological, cardiac, plastic, ophthalmic, and spinal, ENT, maxillofacial, orthopaedic, urological, neuro and general surgical procedures, as well as some dental procedures, frequently use RF electrosurgery. A handpiece with one or two electrodes a monopolar or bipolar instrument and an RF electrosurgical generator, commonly known as an electrosurgical unit or ESU, are used to perform RF electrosurgery. All RF electrosurgery is bipolar; the main distinction between monopolar and bipolar devices is that monopolar devices have only one electrode, whereas bipolar devices include both electrodes built into their design.

When activated, the monopolar device known as an "active electrode" necessitates the placement of a second monopolar device known as a "dispersive electrode" somewhere else on the patient's body. This device's purpose is to "defocus" or disperse the RF current, preventing thermal injury to the underlying tissue. This dispersive electrode is frequently and incorrectly referred to as a "neutral electrode or ground pad. However virtually all currently available RF electrosurgical systems are designed to function with isolated circuits.

Bipolar devices, such a forceps for sealing blood arteries, are typically made with two "active" electrodes. The bipolar instrument, however, can be made with one electrode that is dispersive. The fundamental benefit of bipolar devices is that only the portion of the patient between the two electrodes is connected to the circuit, hence eliminating the possibility of current diversion and its associated negative effects. However, it is challenging to vaporise or cut tissue using bipolar instruments, with the exception of those created to operate in fluid.

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