Faculty of Medical Sciences
Goce Delcev University, Stip, North Macedonia

PRINCIPLES AND APPLICATIONS OF ORAL ELECTROSURGERY

SONJA ROGOLEVA GJUROVSKI,
Verica Toneva Stojmenova, Ljupka Arsovski
Maja Kukuseva Paneva, Sandra Atanasova, Mihajlo Petrovski

28.09.2023

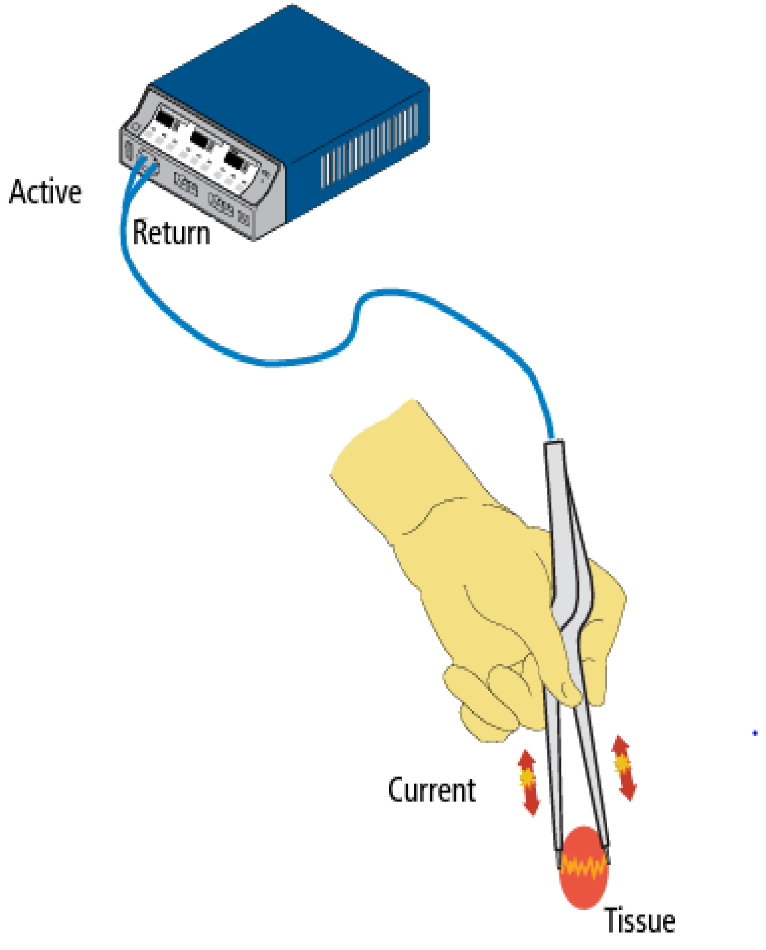
Introduction

- *Electrosurgery - method of choice*
- *Oral electrosurgery is widely accepted throughout the world and has a broad spectrum of clinical applications*

1. **Tissue cutting**
2. **Hemostasis (control of bleeding)**
3. **Soft tissue ablation**
4. **Tissue contouring**
5. **Frenectomy**
6. **Biopsies**

Electrosurgical system contain electrosurgical unit as a generator with active electrodes

- Higher frequency units produce less lateral heat and, therefore, less tissue alteration.
- The optimal frequency appears to be in the 3-4 MHz range.
- Once the practitioner understands electrosurgical instrument and how to control its frequency energy, a comfort zone will be reached, and both the patient and dentist will benefit

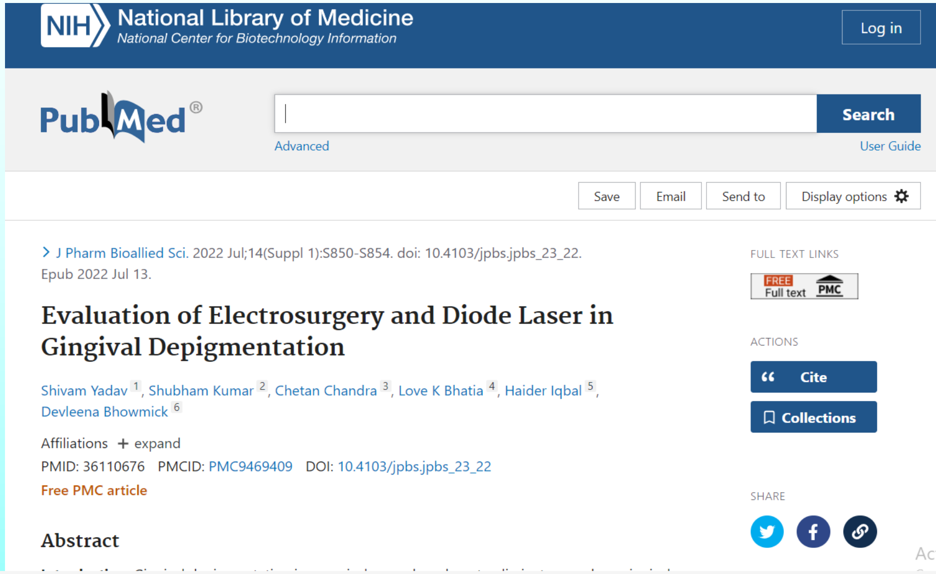


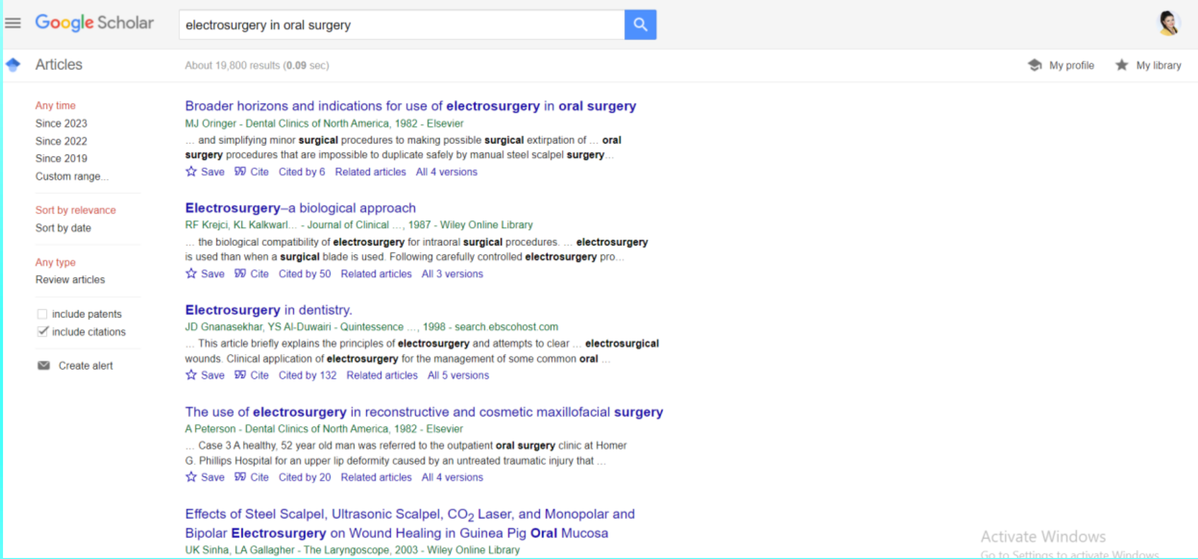
- The active electrode is in the wound.
- The patient return electrode is attached somewhere else on the patient.
- The current must flow through the patient to the patient return electrode.

Materials and Methods

Research strategy

- relevant literature was conducted using electronic databases, including PubMed and Google Scholar
- encompassed studies, clinical trials, and reviews published in the English language from the past 10 years





Evaluation and results

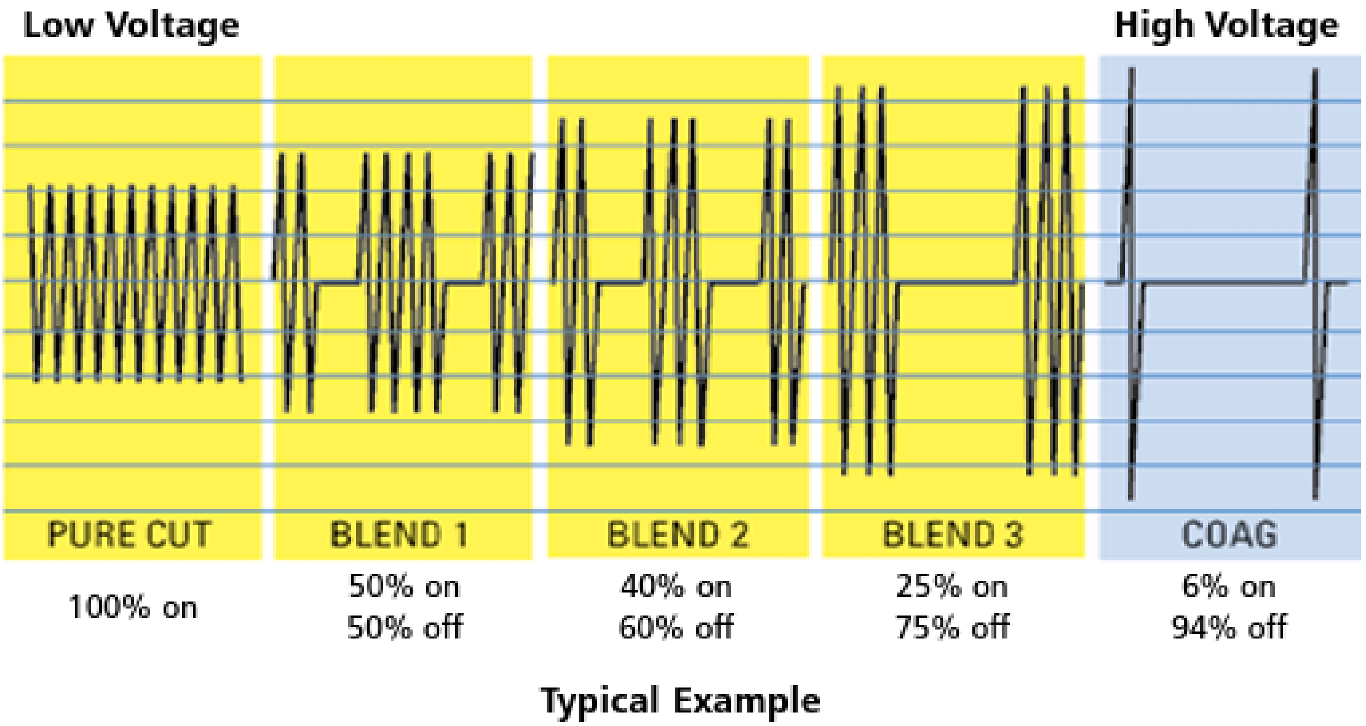
- The reviewed articles consistently highlighted the widespread usage of electrosurgery in various oral surgery procedures, such as soft tissue surgeries, gingivectomy, frenectomy, and periapical surgery.

- The authors of the reviewed articles provided valuable insights and discussions regarding the usage of oral electrosurgery.

Here are some key points raised by the authors:

1. Effectiveness and Advantages
2. Safety measures and Complications
3. Patient Satisfaction and Outcomes
4. Optimization and Future Research measures

- The use of electrosurgery was particularly beneficial in reducing intraoperative bleeding, postoperative edema, and operative time when compared to traditional surgical techniques. The safety of electrosurgery in oral surgery was a major focus in the reviewed studies.
- Although electrosurgery was generally considered safe, the articles emphasized the importance of proper technique, appropriate power settings, and good clinical judgment to minimize potential complications



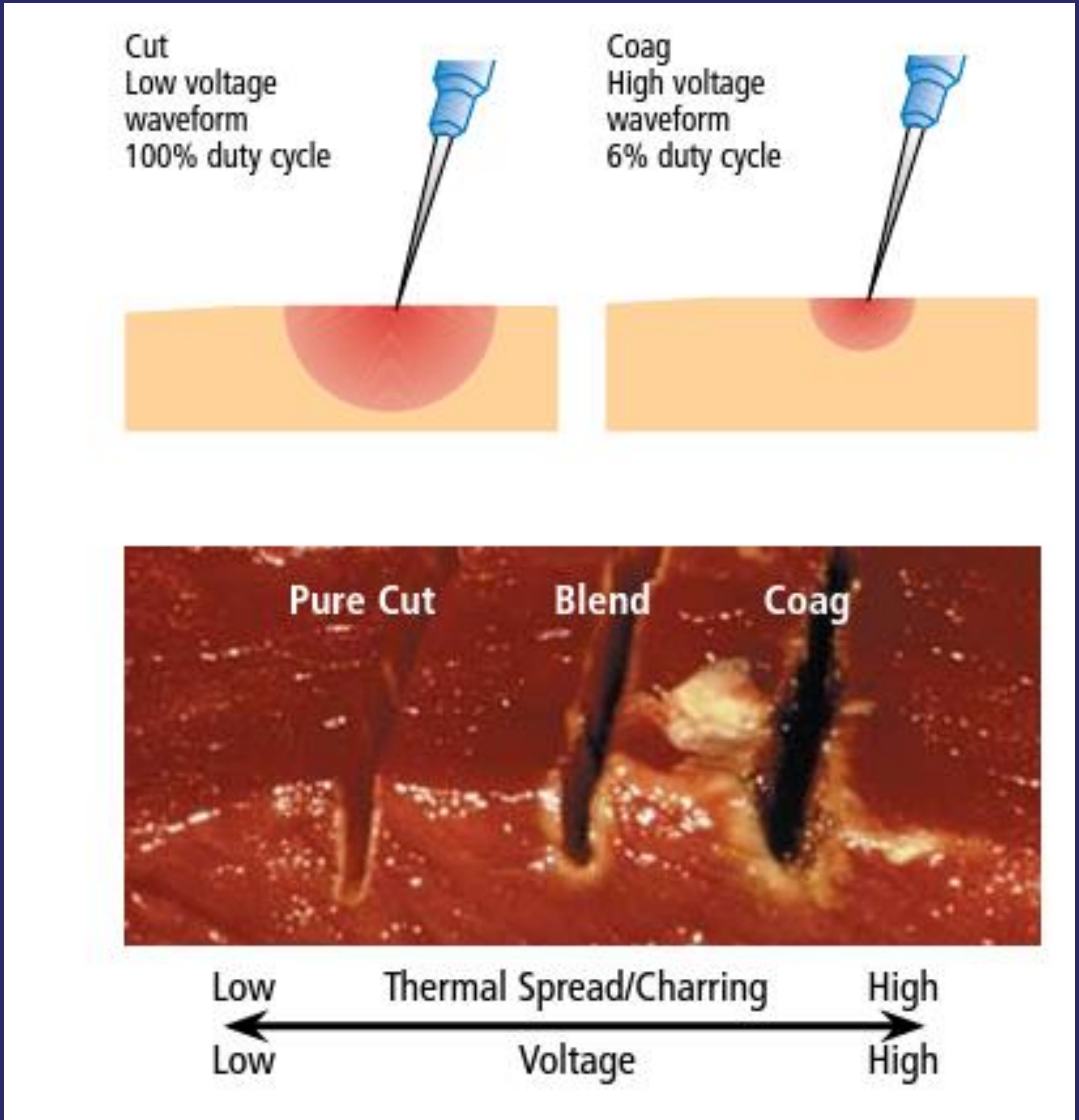
TISSUE EFFECTS CHANGE AS YOU MODIFY THE WAVEFORM

Electrosurgical generators are able to produce a variety of electrical waveforms. As waveforms change, so will the corresponding tissue effects. Using a constant waveform, like "cut," the surgeon is able to vaporize or cut tissue. This waveform produces heat very rapidly.

Using an intermittent waveform, like "coagulation," causes the generator to modify the waveform so that the duty cycle ("on" time) is reduced. This interrupted waveform will produce less heat. Instead of tissue vaporization, a coagulum is produced.

A "blended current" is not a mixture of both cutting and coagulation current but rather a modification of the duty cycle. As you go from Blend 1 to Blend 3 the duty cycle is progressively reduced. A lower duty cycle produces less heat. Consequently, Blend 1 is able to vaporize tissue with minimal hemostasis whereas Blend 3 is less effective at cutting but has maximum hemostasis.

The only variable that determines whether one waveform vaporizes tissue and another produces a coagulum is the rate at which heat is produced. High heat produced rapidly causes vaporization. Low heat produced more slowly creates a coagulum. Any one of the five waveforms can accomplish both tasks by modifying the variables that impact tissue effect.


Cut
Low voltage
waveform
100% duty cycle
Coag
High voltage
waveform
6% duty cycle
Pure Cut
Blend
Coag
Low
Thermal Spread/Charring
High
Low
Voltage
High

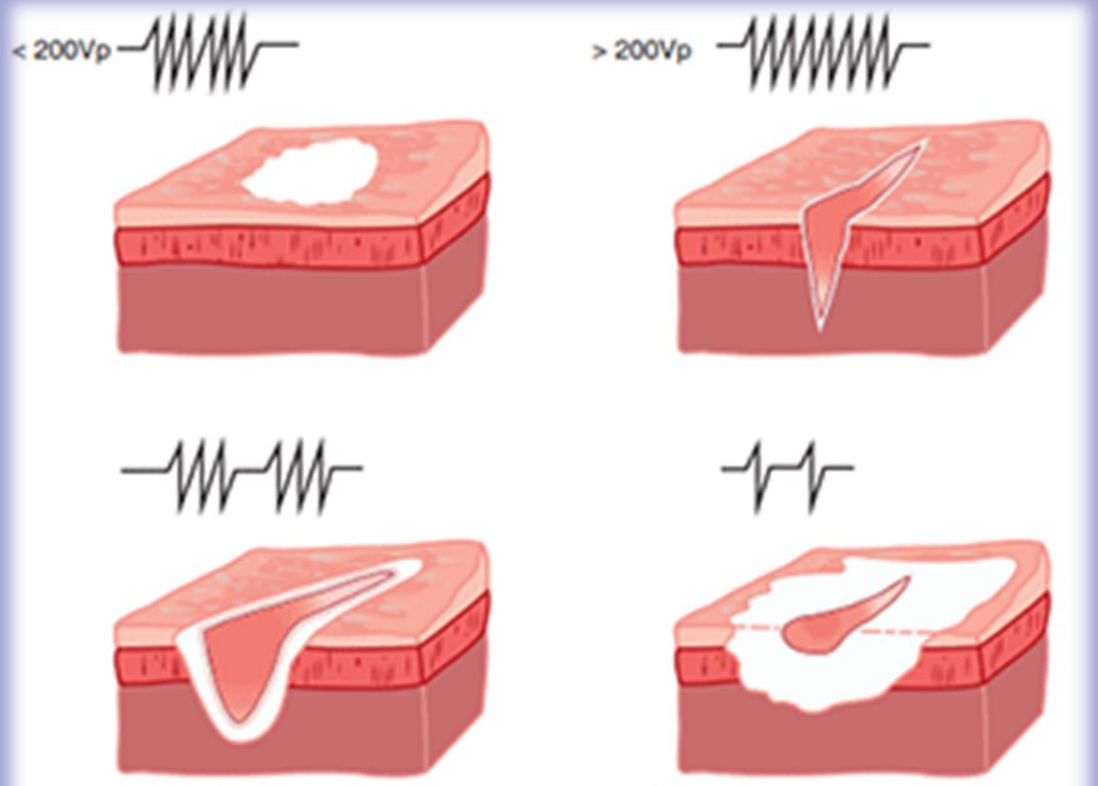
Discussion

Although in the scientific literature review there are some articles on oral electrosurgery, its clinical applications are numerous. In Nixon et al. gingival incisions were performed on 25 adult male guinea pigs. For every animal, an electrosurgical scalpel was used on one side and a conventional scalpel was used on the other side. However, in this study, only one surgical method was applied to each rat in order not to affect wound healing.

Rathofer et al. compared electrosurgery with scalpel for the excision of inflammatory papillary hyperplasia using questionnaires to assess pain and patients' perception of the postoperative period. Most patients did not feel pain during either technique, but the pain and discomfort after the application of electrosurgery lasted longer than with the conventional scalpel.

Sinha et al. reported that limited hemostasis was obtained with the use of conventional scalpel, but buffering with gauze was needed. They also suggested that use of an electrosurgical device provided better hemostasis compared to CO2 laser and conventional scalpel

Size and type of active electrodes the thicker the electrode, the greater the amount of lateral heat. In a study of electrosurgical wounds, it was reported that the needle-type electrode, which is used for incisions, creates a 0,12-mm-wide necrosis, and the loop electrode, used for tissue planing, makes a 0.31- mm-wide necrosis.
The same report also concluded that large electrodes cause more tissue damage than small ones. Wave form the choice of waveform depends on (1) the required Surgical effect, i.e., whether tissue separation or hemostasis is required, and (2) the proximity of bone to the surgical site.



Different waveforms produce different tissue effects.

The fully rectified waveform produces excellent tissue separation with the least amount of lateral heat, but it also produces very little hemostasis The fully rectified, unfiltered waveform produces good tissue separation with effective hemostasis.

Conclusion

Electrosurgery can never completely replace the scalpel, but it requires more knowledge, skill and complete understanding of the biophysical aspects of the interaction of electrosurgical energy and tissue.

Thank you for your attention !

sonja.rogoleva@ugd.edu.mk

Ass. Dr. Sonja Rogoleva Gjurovski
Dental Medicine

Faculty of Medical Sciences
Goce Delcev University, Stip, North Macedonia