

# Radiosurgery 2002



By Jeffrey A. Sherman, DDS, FACP, FICD

Today, the general dentist is faced with a wide range of daily procedures. These can vary from routine restorations to advanced forms of periodontal or oral surgery. The general dentist must constantly update his/her base of knowledge for the rapidly changing procedures and materials becoming available.

The private general dental practice usually features a component of periodontal therapy as well as the restorative and crown and bridge elements. Effective soft tissue management is fundamental to success in these disciplines. Tissue removal can be accomplished by curette, scalpel, electrosurgery, and more recently with radiosurgery.

Radiosurgery is one of the most important and versatile instruments in dentistry today. Its numerous uses range from performing precise surgical incisions to establishing hemostasis. It is a learned skill that takes time and practice to master. The radiosurgery instrument should be readily available in the operatory for ease of setup and use.

Radiosurgery is one of the most important and versatile instruments in dentistry today. Its numerous uses range from performing precise surgical incisions to establishing hemostasis.

### WHAT IS RADIOSURGERY?

Radiosurgery is the removal of soft tissue with the aid of a radio signal. This radio signal operates within the frequency of 3 to 4 megahertz (MHz). The older electrosurgical instruments, while performing similar procedures, operated at a frequency of 1 to 2.9 MHz.<sup>1</sup> Research has shown that these low frequencies produced more lateral heat to the surrounding tissues and should be avoided when in close proximity to bone. Radiosurgery at 3.8 to 4 MHz in frequency offers the advantages of a safe, fast, and efficient micro-incision with an excellent field of visibility. Published research studies confirm adjacent nontarget tissue alteration at 15 to 30 µm with a frequency of 4 MHz. The patient experiences a pressureless incision with a minimal amount of bleeding, which often requires no suturing and reduces bacteria and healing time. The radio wave produces a finer, less traumatic incision, and therefore has seen increased usage in all forms of delicate periodontal and cosmetic surgery.<sup>2,3</sup>



Figure 1. The Ellman Dento-Surg is a radiosurgery instrument operating at 3.8 MHz and offers four different cutting and coagulating waveforms. The instrument does offer bipolar capability using the Ellman Silicone Bipolar Adapter.

WAVEFORM	TISSUE USAGE	SECTIONING	LATERAL COAGULATION	HEAT	WAVEFORM ON OSCILLOSCOPE
Fully rectified filtered	pure cutting	excellent	minimal	least	
Fully rectified	cutting with hemostasis	very good	very good	more	
Partially rectified	coagulation on soft tissue	very poor	excellent	slightly greater	
Fulguration	superficial destruction and coagulation near bone	none	excellent for osseous surgery	greatest	

Figure 2. Comparative differences of the four waveforms in radiosurgery.



Figure 3. A delicate incision performed with a Fully Rectified waveform and a Vari-Tip No. 118 electrode.

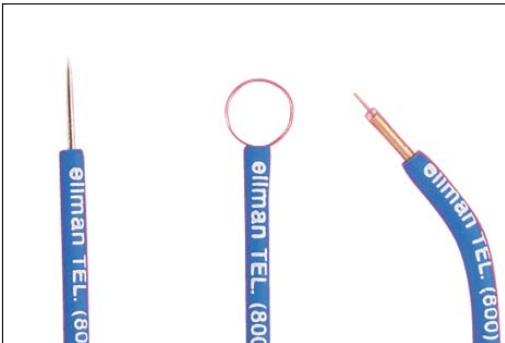


Figure 4. A Pencil Point No. 113F coagulating electrode, a Loop No. 128 tissue planing electrode, and a Vari-Tip No. 118 incising electrode (left to right). Radiosurgery uses a microfine, single surgical tungsten wire to make the delicate incisions.

The use of the high-frequency radiosurgery instrument allows the doctor to perform a large variety of soft tissue procedures efficiently and with predictable results. A typical radiosurgical instrument should

include four different waveforms as well as a variety of autoclavable electrodes and autoclavable handpieces<sup>1</sup> (Figure 1).

The waveforms include Filtered for incising tissue, and Fully Rectified for incising tissue



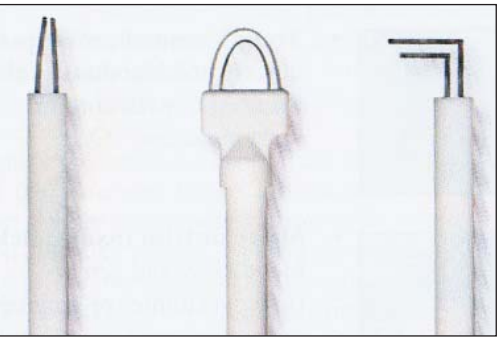


Figure 5. Bipolar surgery uses an electrode with two thick wires parallel to each other. One wire acts as the antenna while the other actually does the cutting. The two wires make it extremely difficult to make a fine delicate incision as required in dentistry.



Figure 7. Line drawing depicting gingivectomy to expose subgingival decay.



Figure 9. The tissue is removed following the contour of the tooth and fully exposing the decay.



Figure 11. The tissue is irrigated with Peridex post-operatively.

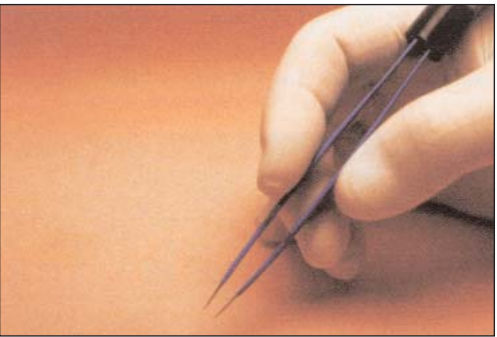


Figure 6. A J1 bipolar forceps provides precise, pinpoint coagulation.

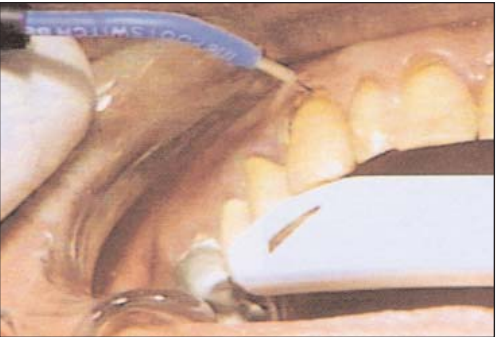


Figure 8. Vari-Tip No. 118 electrode exposing subgingival decay. A Fully Rectified waveform was used to establish coagulation during tissue removal.

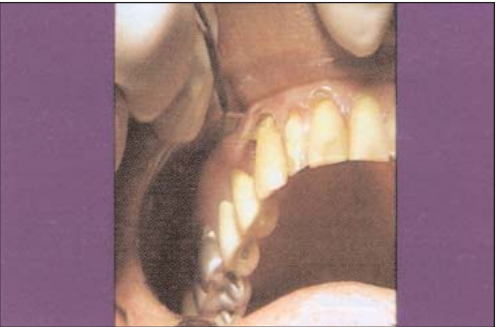


Figure 10. Composite placement is simplified with the aid of radiosurgery. Hemostasis allows the composite to be placed without compromise of bleeding.

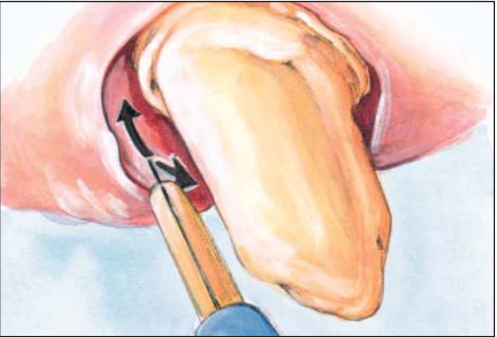


Figure 12. The electrode is kept parallel to the tooth when removing tissue. This prevents cutting the height of the tissue and assures predictable healing.

hemostasis when in close proximity to the bone. A spark is produced to coagulate blood, with no tissue contact being required. This waveform is also used for the destruction of cyst or granulomatous tissue remnants during biopsy and apicoectomy procedures<sup>1,4</sup> (Figure 2).

The radiosurgical instrument can be finely tuned and, when used with the Filtered waveform, can produce microsmooth incisions that can perform the most delicate of periodontal procedures.

*In the general dental practice, radiosurgery is used throughout the day for a number of very common soft tissue procedures.*

With a scalpel blade, the point of application is the precise point at which the incision is made. Similarly, with the high-energy radio waves of the radiosurgery electrode tip, the incision is visible at the point of application, with the energy reducing rapidly from the high intensity at the applied tip as the energy is dispersed into the tissues. This means that the effect of the application can be accurately observed, with the ability to finely judge and tune the instrument for optimum performance and with respect for tissue safety (Figure 3).

Radiosurgery offers the ability to perform as both a monopolar and bipolar instrument. In the monopolar mode, the incision is made with a microfine, single surgical tungsten wire (Figure 4). This mode is used to delicately and precisely remove or recontour soft tissue. The bipolar mode is used for precise pinpoint coagulation during microsurgery. Bipolar surgery uses an electrode with two thick tip wires

parallel to each other (Figure 5). The cutting signal travels between the wires, creating a trough or coagulation. In dentistry it is difficult to produce a fine incision with two tips, one actually cutting and the other acting as the antenna. Tactile sense, especially around teeth, is considerably reduced. This modality is used frequently in medicine where bleeding is prevalent, rather than in dentistry where we work in a relatively blood-free environment.<sup>5,6</sup>

The Ellman Dento-Surg is the only true radiosurgical instrument currently available for dental applications (Figure 6). This device does have bipolar capabilities, using the bipolar adapter from their medical device. Ellman offers a full selection of bipolar instruments in the medical field.

In dentistry we can use bipolar for its hemostatic ability in a wet field. I do have bipolar experience; however, I prefer using a single wire for the precision and control. I have found that it is much easier and safer to control one wire instead of two, and one wire through my experience gives a more predictable and consistent result, especially in the anterior of the mouth where the area is rather limited. Rather than concentrate on two wires and where they are placed, I prefer to use and teach monopolar radiosurgery at 4 MHz in my own practice because of its precision, control, ease of use, and consistent predictable results.

**RADIOSURGERY PROCEDURES**

In the general dental practice, radiosurgery is used throughout the day for a number of very common soft tissue procedures. Radiosurgery is used to expose subgingival decay, leaving a clear field in a relatively blood-free environment (Figures 7 through 11). This blood-free preparation facilitates the placement of aesthetic bonded restorations with rapid healing. This procedure eliminates the need

with concurrent coagulation being performed. The Filtered waveform is used for any incisions that may be deep or in close proximity to

the bone. The Fully Rectified waveform is useful in all forms of tissue removal that are superficial and not close to the bone. A Partially

Rectified waveform is used only for coagulation of the soft tissue and never to make an incision. A Fulguration waveform is used to establish



### Radiosurgery 2002

continued from page 99

for using retraction cord and hemostatic agents for hemostasis.

Radiosurgery is used to

perform more predictable crown preparations. The tissue in the sulcus is removed to form a subgingival impression funnel or trough around the finish line of a crown preparation. The removal of

the inner sulcular epithelium permits better visibility of the finish line and facilitates its improvement. The soft tissue funnel or trough created permits a more accurate impression due to the hemo-

static abilities of the radiosurgery. Again, the use of retraction cord as well as hemostatic agents can be eliminated since the radiosurgical trough accomplishes this. The trough is also used

to enhance porcelain laminate veneer preparation and placement.<sup>7</sup>

Radiosurgery offers the advantages of performing any oral surgery procedure in a relatively blood-free environment. Gingivectomies, gingivoplasties, frenectomies, apicoectomies, pulpotomies, and biopsies are only some of the more advanced uses of radiosurgery.

The most common procedures performed by the general dentist are gingivectomies and gingivoplasties. These procedures are performed to expose subgingival decay, establish a more cosmetic smile line prior to veneer or crown placement, and cosmetically increase the crown-to-root ratio. The tissue is incised with either the Filtered or Fully Rectified waveforms. The Filtered waveform is used in areas where the tissue is delicate and minimal tissue alteration is desired. The Fully Rectified waveform is used where the tissue is thick and fibrotic, or in areas of hyperemia that require immediate hemostasis. Hemostasis can also be established with the aid of the Partially Rectified waveform. This waveform is most important in ensuring a dry, blood-free environment for placement of a more aesthetic bonded restoration.

When making incisions for tissue removal, the fine, straight wire Vari-Tip No. 118 electrode is used. The tip is placed in close proximity to the tissue before the power is activated. The tip is kept parallel to the tooth to prevent removal of excessive tissue height. The incision is made in layers, waiting 10 seconds before reentering the same surgical site (Figure 12). After adequate tissue removal, any necessary hemostasis can be accomplished with the use of the pencil-shaped electrodes Nos. 113F and 117. These electrodes are used with the Partially Rectified waveform. Broad areas of hemorrhage not involving interproximal tissue can be accomplished with the aid of the ball-shaped Nos. 135 and 136 electrodes.<sup>1,4</sup>

A postoperative dressing is indicated for all areas of radiosurgery. Areas of minimal tissue removal such as exposing subgingival decay

## Add \$75,000+ Revenue to Your Practice This Year Using Ellman Radiofrequency!!

# ellman

## Dento-Surg 90 FFP

Plus  
**BIPOLAR!**



Dento-Surg 90 FFP  
314-9986.....\$1,495.00



Dr. Tom Orent  
1000 Gems Seminars™  
Gems Publishing, USA

### 1000 GEMS SEMINARS

"Radiosurgery is perhaps one of the simplest, most clinically effective (and profitable) procedures available to us today and yet one of the most underutilized as well...the Ellman Dento-Surg 90 FFP Radiosurgery unit allows the practitioner precise control, patient comfort, and excellent healing. It's truly a gem that allows us to produce excellent dentistry and dramatically increases profitability at the flick of a switch."

### GINGIVECTOMY

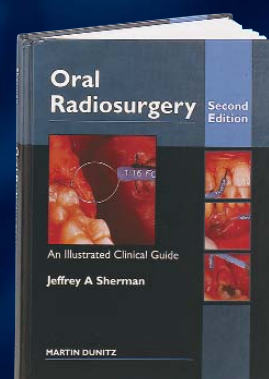


Photos courtesy of  
Dr. P. D. Miller



Immediate Post-op

Photos courtesy of  
Dr. Randolph Shoup



Textbook by Dr. Jeffrey A. Sherman

Oral Radiosurgery -  
An Illustrated Clinical  
Guide  
315-2485.....\$164.95

**Available exclusively through Patterson Dental Supply Inc.**

For more information call:  
**(800) 835-5355 • www.ellman.com**

**ellman** international. inc.

1135 Railroad Ave. Hewlett, NY 11557-2316

AD-196d



or for troughing crown preparations can be protected by irrigating the surgical area with Periogard or Peridex. A coating of Isodent can also be applied to areas of minor surgery. More extensive tissue removal, as for preprosthetic surgery, warrants a periodontal pack such as Coe-Pak, Zone, or Barricade.<sup>2,8</sup>

The increased number of procedures that can be performed with radiosurgery will more than compensate the doctor for the time and expense in becoming proficient with the technique. The procedures are reimbursable from insurance companies using the CDT codes for the particular procedure. A one-tooth gingivectomy is listed as No. 04211, while a quadrant is listed as No. 04210. These fees vary from region to region and can be obtained by speaking with a local periodontist or oral surgeon.

CONCLUSION

Radiosurgery is a modality that belongs in every general dental office. It is safe, easy, and predictable. I strongly recommend taking a participation course to become fully versed in the use of radiosurgery.♦

**Dr. Sherman** maintains a private general dental practice in Oakdale, NY. He is the world's leading authority in the field of radiosurgery. He has published two textbooks and numerous articles in national and international dental journals on the subject and has two technique videos. Dr. Sherman is a diplomate of the American Board of Oral Electrosurgery and a fellow of the American College of Dentists and the International College of Dentists. He has lectured at numerous dental schools and meetings throughout the world. He can be reached at (631) 567-2100 or ESURG@aol.com.  
*Disclosure: Dr. Sherman's textbook, Oral Radiosurgery, and his Video Atlas are both available from Ellman International and Patterson Dental. Royalties from book and video sales are paid by the publisher. Dr. Sherman has no financial interest in Ellman International.*

References

1. Sherman JA. *Oral Radiosurgery: An Illustrated Clinical Guide*. London, England: Martin Dunitz; 1997.

2. Kalkwarf KL, Krejci RF, Wentz FM, et al. Epithelial and connective tissue healing following electrosurgical incisions in human gingiva. *J Oral Maxillofac Surg*. 1983;41:80-85.

3. Maness WL, Robert F, Clark RE, et al. A histological evaluation of electrosurgical incisions varying frequency and waveform. *J Prosthet Dent*. 1978;40:304.

4. Sherman JA. *Oral Electrosurgery: An Illustrated Clinical Guide*. London, England: Martin Dunitz; 1992.

5. Sherman JA. Radiosurgery: the safe,

indispensable technology in dentistry. *1000 Gems Update*. 2001;Spring:19-21.

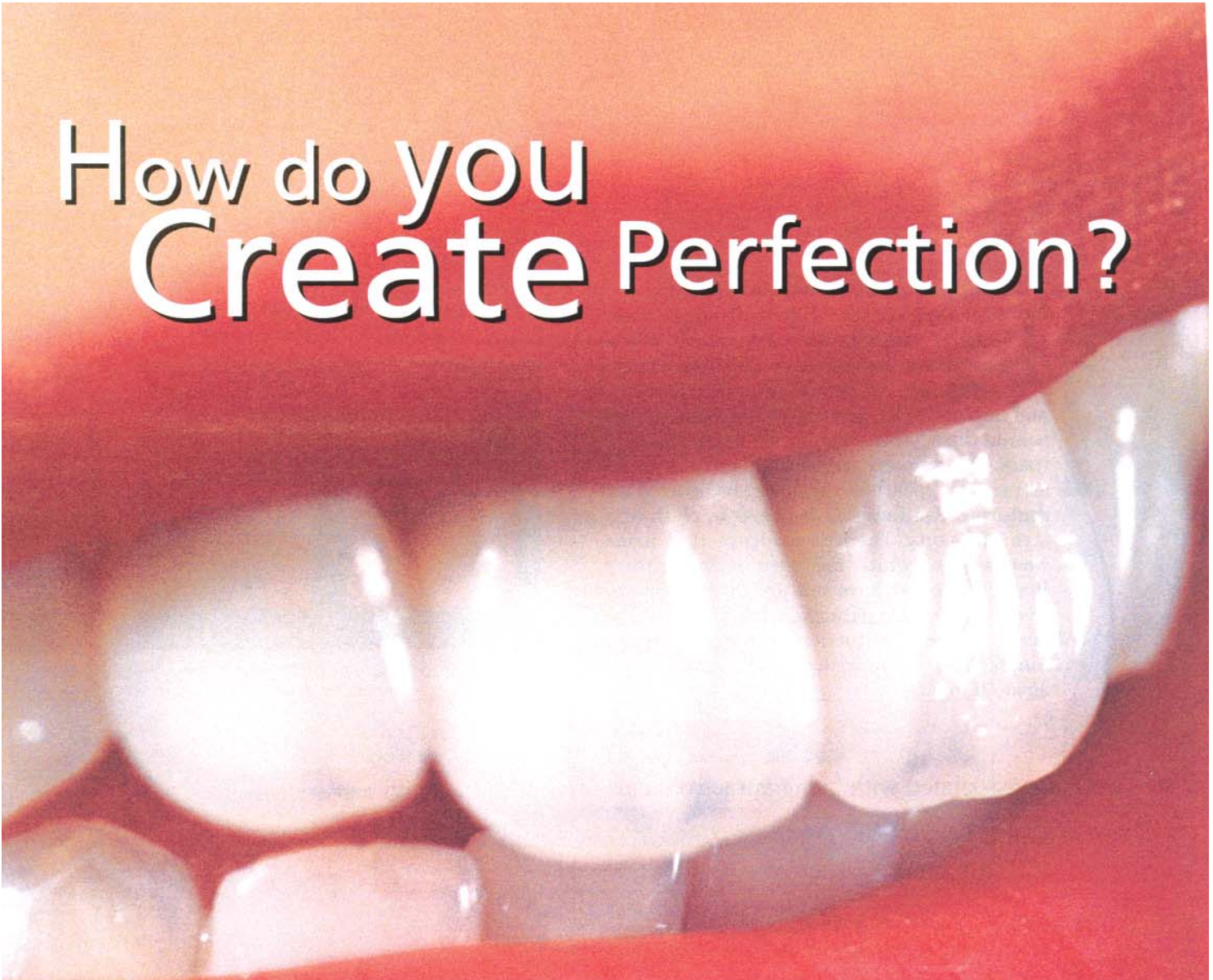
6. Shuman IE. Bipolar versus monopolar electrosurgery: clinical applications. *Dent Today*. 2001;20:74-81.

7. Flocken JE. Electrosurgical management of soft tissues and restorative dentistry. *Dent Clin North Am*.

1980;24:247.

8. Kalkwarf KL, Krejci RF, Wentz FM. Healing of electrosurgical incisions in gingiva: early histologic observations in adult men. *J Prosthet Dent*. 1981;46:662-669.


# How do you Create Perfection?



## IPSEmpress®

The ultimate in metal-free esthetics.

Call us toll free at 1-800-533-6825 in the U.S., 1-800-263-8182 in Canada. [www.ivoclarvivadent.us.com](http://www.ivoclarvivadent.us.com)  
© 2001 Ivoclar Vivadent, Inc. IPS Empress is a registered trademark of Ivoclar Vivadent, Inc.



ivoclar  
vivadent  
technical

**FREE FACTS, circle 64 on card**