Radio-surgery: A 25 year history of scarless mole removal

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Abstract

Our 25 year experience utilizing ultra-high radio-frequency instrumentation (Ellman International, Hewlett, NY) is reviewed. By minimizing lateral heat spread, fine wire electrodes of varying shapes have been accurately employed to shave benign facial lesions and ablate facial telangiectasias with minimal trauma, recovery time, or cutaneous demarcation. Incisions and suturing were rarely necessary and surgical scars were not evident.

Keywords: radio-frequency, radio-surgery, benign skin lesions, telangiectasias, nevi, moles, spider veins

1. Introduction

Electro-surgical instrumentation has been available for more than 100 years. Its initial advantage was improved hemostasis. With further evolution, and the development of instrumentation utilizing ultra-high frequency radio waves (3.8–4.0 Mega Hertz), the surgeon was given a tool that not only facilitated hemostasis, but often obviated the need for resection, increased the accuracy of resection when it was necessary, minimized lateral heat spread, decreased healing time, and often avoided any surgical scar.

We have used this instrumentation for 25 years to perform the complete spectrum of ophthalmic plastic surgical procedures with great efficiency and accuracy. But perhaps the greatest strength of this instrumentation is its use to remove benign facial lesions and ablate facial telangiectasias or spider veins. We will review the techniques that we have employed, emphasizing their ease, efficacy, and rapid, complete healing.

2. Patient selection

This instrumentation can be used on lesions regardless of size and location, benign or malignant. However if ultra-high frequency radio-surgery is used on a suspected malignancy, care must be taken to avoid charring of the edges of the biopsy specimen. This instrumentation must not be used on patients who have non-insulated cardiac pacemakers. A plastic corneo-scleral protective contact lens must always be used when resecting eyelid lesions.

For the purposes of this review, we have considered only facial lesions, pigmented and non-pigmented, raised and flat, vascular and non-vascular. The size and location of the lesion will determine the nature of the local anesthesia used (either topical or injected) and the size and shape of the electrode used.

3. Patient preparation

Patients wearing an uninsulated cardiac pacemaker are not candidates for this procedure.

If the patient has a history of easy bruising, sublingual Arnica Montana (C5) may be initiated on the day before surgery (3 pellets, four times daily).

The passive electrode (antenna) is placed under the patient as close to the operative site as possible. It does not have to be touching the patient’s skin.

Plastic corneo-scleral protective contact lens should be available if the lesion is near the patient’s eyes.

If the lesion is large, a smoke evacuator should be available to suck away the vapor plume during the resection.

4. Techniques

The use of this instrumentation is extremely operator-dependent. A steady hand with a smooth, light touch is invaluable. Practising with a paintbrush is helpful. This will train the surgeon to stroke the tissue with the electrode, barely touching it, making a clean, smooth stroke, without tissue drag. The goal is to make a meticulous incision, or a layer by layer shaving of the tissue, creating as little inflammation as possible in the surrounding tissues. Minimizing
For small lesions of the eyelid margin and between the eyelashes a fine tungsten wire electrode is used to preserve the eyelashes and lid margin.

For facial spider veins, cherry angiomas and telangiectasias, insulated fine tungsten wire electrodes of 0.7, 0.8, and 0.9 mm diameters are used to collapse and seal these vascular lesions, while protecting the overlying skin.

4.3 Selecting the wave form (type of current)

The cutting current (fully filtered and rectified) also contains a small amount of hemostatic capacity (10%). It is the wave form that allows the cleanest incision or shaving, with the least lateral heat spread and, if used properly, the least amount of tissue char. We used this for shaving and resecting skin lesions. If additional hemostasis is necessary, the area that needs to be coagulated is grasped with a fine toothed forceps and the electrode is then applied to the forceps, without changing the wave form.

The blended current (50% cutting and 50% coagulation) is fully rectified. It initiates more lateral heat spread than the cutting current, and so we only utilized it when resecting a very vascular lesion or when performing subcutaneous, muscle or fat dissections.

The hemostatic current (partially rectified) was primarily employed with the fine tungsten wire insulated electrode to seal small blood vessels and to perform electrolysis (when treating trichiasis or misdirected eyelashes).

The fulgurating current is too destructive and generates too much lateral heat spread to be used to remove facial lesions when desiring the maximum cosmetic result.

4.4 Setting the power

The lowest power level that allows the electrode to pass through the tissue, without tissue drag and without sparking or charring, will be the appropriate setting. Typically this is between 2 and 3, but may be higher if the passive electrode (antenna) is placed in a distant location.

4.5 Post-resection course

Following layer by layer shaving of a raised or flat lesion, there was mild crusting for one or two days, followed by mild erythema which typically diminished over a one to two week period. Rapid re-epithelialization was encouraged with frequent, generous applications of erythromycin ointment. In patients predisposed to post-inflammatory hyperpigmentation, topical hydrocortisone 1% and zinc oxide were added to the post-resection regimen.

Mild to moderate erythema at the treatment sites follow radio-surgical ablation of vascular facial lesions. Topical 2% hydrocortisone diminishes the erythema during the week following initial treatment. Topical antibiotics were not used for these patients.

4.6 Possible complications

Since this technique is so operator-dependent, excessive shaving or resection can rarely leave a depressed scar. Tem-
lateral heat spread, will minimize post-operative inflammation. Lateral heat spread is minimized by using a very fine wire electrode, passing it through the tissue quickly and without tissue drag.

4.1 Selecting anesthesia

Flat lesions, or lesions that are elevated less than 2 mm can effectively be anesthetized with topical anesthesia (Polarcaine, University Pharmacy, Salt Lake City). This will allow complete removal without distortion of the tissue and with preservation of normal surrounding tissues. More markedly raised lesions require local infiltration.

4.2 Choosing an electrode

For raised lesions less than 0.5 mm in diameter, a small loop electrode can effectively shave the lesion layer by layer, or transsect it at its base with one pass. For lesions of larger diameter, larger looped electrodes can be used. After the bulk of the lesion has been transsected, the loop can then be used to shave the edges of the resection, forming a smooth, contiguous margin with the host bed. If a larger diameter lesion is on a small narrow stalked pedicle, a looped electrode large enough to pass over the lesion is needed to transsect the stalk. Or a small loop electrode can be used to transsect the stalk from the side.

For flat lesions regardless of diameter, a small loop electrode can be used to effectively shave to lesion while preserving normal tissue.
porary post-inflammatory hyperpigmentation can occur in patients with skin types III or higher. Larger, deeper lesions can recur when they are shaved flush with the adjacent tissues and not completely resected.

This procedure should not be performed on patients with non-insulated cardiac pacemakers. Since it is possible for this instrumentation to produce a spark, it should not be used with flammable gases (ethylene, propylene, diethyl ether) or ethyl chloride. A smoke evacuator should be used to reduce odor and particulate matter in the vapor plume produced during resection.

Conclusion

Ultra-high frequency radiosurgical removal of facial lesions is a convenient and effective method that yields superior results with a shortened healing time.

References