Industry Newsletter Edition 63 - August 2008

Hello and Welcome to our Industry Newsletter for August 2008.

This month's edition of our Industry Newsletter features the following sections:

- **From the Editor's Desk**
- **Latest News**
- **Our Feature Article, this month entitled *How to Get Rid of Lumps & Bumps* -** *Understanding Radiosurgery With Dr. Patrick Treacy.*
- **Book Review**
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- **Equipment Sales**
- **And Finally...**

Please read on...

Feature Article

How to Get Rid of Lumps & Bumps
Understanding Radiosurgery With Dr. Patrick Treacy

Moles, warts, skin tags and other so called ‘lumps and bumps’ can be both upsetting to look at and cause social and psychological unease for those whose face is blighted by such growths. With increases in the occurrence of skin cancers we are well advised to seek professional, medical advice about any growths which appear over night or change dramatically in appearance. Thankfully though, most growths are benign and harmless, and removal is often quick and simple with reassuring cosmetic results.

Dr Patrick Treacy, our *Guest Writer* for this month’s Consulting Room™ newsletter, takes us through the rarely talked about technique of radiosurgery, used to cut and coagulate tissue and remove or destroy harmless growths and malformations that some of use are simply born with and some of us develop with age and environmental exposures.

Background to Radiosurgery

The term Radiosurgery is quite confusing in medicine as the term actually refers to two different surgical modalities. It is worth taking the time to look at the differences between the two to make sure there is no confusion.

The first radiosurgery (Stereotactic Radiotherapy) is a medical procedure which allows non-invasive treatment of benign and malignant conditions as well as vascular malformations by means of directed beams of ionizing radiation, such as gamma rays. This form of radiosurgery was first developed in Sweden in 1949 to irradiate brain tumour lesions.

The second type of radiosurgery (Radiofrequency or Radiowave surgery) is the cutting of tissues using a high frequency alternate current. This surgical modality is very different from traditional electrosurgery and other forms of electrocautery as it can simultaneously cut and coagulate tissues without applying any pressure.

Traditional electrosurgery devices cut skin tissue by passing a electric current through the patient and using the electrode tip (a platinum wire) to provide resistance, effectively causing high temperature heating of the electrode

tip and excessive lateral (surrounding) tissue damage. There is also potential risk of shock and burn to the patient as well as post operative pain from unsealed nerve endings.

The principle of radiofrequency or radiowave surgery is that it uses high frequency radiowaves, at 4.0 MHz, to deliver low temperatures through radiofrequency (RF) micro-fibre electrodes. The waveband utilised is similar to the frequency of marine band radios.

The difference between this method and electrosurgery is that the tissue serves as the resistance instead of the electrode. This means there is no heating of the RF micro-fibre electrode by the use of low temperature RF radiowave energy. Instead, the intracellular tissue water provides the resistance and vaporises without the heat and damage seen in electrosurgery. This tissue vaporisation also results in significant haemostasis (stopping of the flow of blood) without actually burning the tissue. In addition, there is no danger of shocking or burning the patient.

Most important is the fact that there is controlled and minimal lateral tissue damage with 4.0 MHz high frequency, low temperature radiowave surgery. This effectively means less damage, less post operative pain, faster healing and less blood loss and better healing.

What is Radiofrequency/Radiowave Surgery Used For?

Radiofrequency or radiowave surgery is extremely versatile and can be used in many medical specialities including General Surgery, Craniofacial Surgery, Oral Maxillofacial Surgery, Gynaecology and Neurosurgery.

In Dermatology and Cosmetic Medicine it is used for minor surgical procedures such as removing telangiectasias (thread veins), sculpting rhinophyma (bulbous growths on the nose), flattening and sculpting nevi (birthmarks and moles), postsurgical irregularities, scars revision, sebaceous hyperplasia (cauliflower shaped growths), ‘‘unroofing’’ cysts, etc.

In Plastic Surgery it is used in many aesthetic procedures such as eyebag removal (blepharoplasty) and facelifts (rythidectomy).

Many studies have shown the technology also provides excellent results during removal of superficial carcinomas (e.g. skin cancers) as well as debulking and delineating deeper skin cancers as in Mohs surgery.

Uses of RF in dermatosurgery:

1. Removal of skin tags, warts, seborrheic keratoses (harmless skin growths), syringoma (harmless tumours within sweat glands), and trichoepithelioma (harmless tumours within the hair follicle).
2. Removal of melanocytic nevi (brown moles), telangectasias (thread veins), early skin tumours.
3. Skin biopsies and grafts.
4. Resurfacing of scars (chicken pox, acne etc.).
5. Primary resection of keloids (thick, raised scars).
6. Debulking of skin tumours.
7. Depilation.
8. Resurfacing in case of Rhinophyma, Darier’s disease etc.
9. Blepharoplasty.
10. Hair restoration surgery: scalp reduction, scalp lifting, scalp flaps.
11. Excision of plantar fibromata (warts on the feet - verrucas), in-growing toe nail.
12. Non ablative face lift.

Many studies have shown radiowave surgery to be superior to laser incisions and comparable to scalpel incision.

In earlier days, surgeons were reluctant to incise the skin and subcutaneous tissues with an electrosurgical instrument under a belief that these devices increase devitalised tissue within the wound, which in turn leads to increased wound infection, increased scarring, and delayed wound healing. With the development of very high-frequency electrosurgical units, which are capable of delivering a pure sinusoidal current, most of these lacunae have been overcome. This has generated a renewed interest in the field of electrosurgery.

Advantages of radio-surgery include:

1. Rapid healing.
2. Minimal or no bleeding.
3. Aesthetically pleasing scars or no scars.
4. Lesser operating time.
5. Office/Clinic procedure.

What Happens During Radiosurgical Treatment?

Radiofrequency surgery involves the passage of radio waves (frequency of 1.5 to 4.5 MHz) into the skin to perform removal or reshaping of a lesion. The commonest frequency used is 4 MHz.

The radio waves are generated by a radiosurgery unit, which creates a very high-frequency radio wave. The radio-surgical unit consists of an electrode, a ground plate and a transformer.

The transformer changes the main voltage of 110/220 AC to a high-voltage and high-frequency current. This current of 4MHz is then further modified by filtering and rectification to produce 1 of 4 waveforms.

Generally four types of radio waves are generated by the unit:

1. Fully filtered: suitable for cutting.
2. Fully rectified: which cuts as well as coagulates.
3. Partially rectified: suitable for coagulation of bleeding vessels.
4. Spark gap wave form: suitable for fulguration.

The power settings can be adjusted to obtain the type of radio wave desired. The fully filtered setting is suitable for cutting as it produces least lateral heat. The fully rectified setting is suitable for cutting but also produces enough lateral heat to coagulate the blood vessels. There are two other settings; partially rectified modulated, which is suitable for coagulation; and fulguration or spark gap waveform that produces dehydration. This last waveform is used primarily for large masses to create an electrodessication.

The ground plate or antenna is plastic coated and is usually placed under the patient. The “patient electrode” looks like a small loop and is held by the operating surgeon during the procedure. Different types of electrodes are used depending on the type of lesion e.g. fine needle electrode, wire loop electrode, scalpel blade electrode etc.

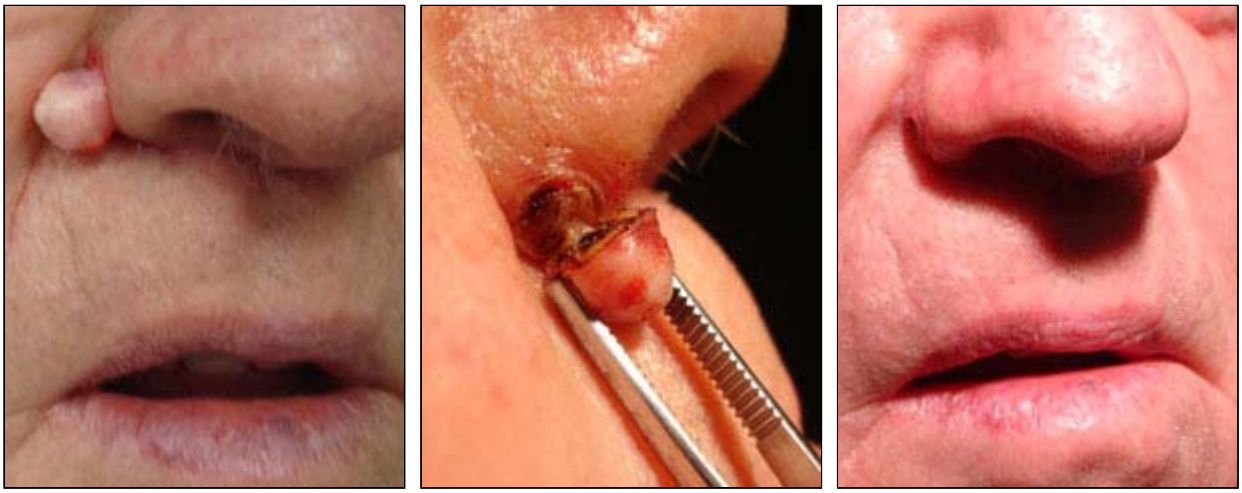
The lesion should be touched with the tip of the electrode. It generates very little heat as compared to conventional electro-cautery. This results in negligible collateral damage, resulting in faster healing and minimal scarring. The radiowaves travel from an electrode tip to the lesion and return to the unit through the ground plate. When radio energy passes between the ground plate and the patient electrode, it is concentrated at the electrode end, resulting in the release of energy, which produces steam within the cells, thus vapourising them and dividing the tissues. This occurs because of heat produced by the tissue resistance to the passage of a high-frequency wave. The heat makes the intracellular water boil and thereby increases the cell inner pressure to the point of breaking it from the inside to the outside. This phenomenon is called a cellular volatilisation.

Unlike with electrocautery, the electrode remains cold and no electrical contact needs to be made between the patient and the ground plate.

Many studies have demonstrated significant advantages to the use of electrosurgical incision, including shorter operating time, reduced postoperative pain, and sealing of lymphatics during excision of malignant tumours.

Radiosurgery Case Studies – Before and After

Radiosurgery is commonly used to remove moles and skin growths.



The use of radiosurgery for surgical cosmetic procedures such as blepharoplasty (eye lid surgery) – see this series of photos which illustrates the blood less process.

A case study showing before and after blepharoplasty with radiosurgery.

Training in Radiosurgery

Learning the technique

The first obvious difference is that no pressure should be used either to aid cutting or coagulation and one has to learn a very different technique from that used in conventional scalpel surgery.

If you are used to pressing the scalpel firmly through the tissues in order to achieve a result, you have to

remember that it is the radio wave and not yourself that does the actual cutting. The power settings on the machine have to be learned by practical experience. It is beneficial to use a piece of raw steak placed on the ground electrode as a teaching aid prior to using this technology on patients. It is probably better to start cutting with high power, and then to gradually lower the intensity until you find the correct level.

The technique is comparatively simple and a small moist lesion requires less power to remove than a larger fibrous keratinised lesion. If you need to do repeated ‘shaves’ of the same lesion leave enough time for the edges to cool between incisions.

A preferable aesthetic result is guaranteed if you first remove a histological sample and then gradually 'plane ' off the remainder of the lesion until it is flush with the surrounding skin. The technique is easy to learn and like most procedures is dependent on your microsurgery skills. The electrodes are self-sterilising in use.

The unit and accessories

I use a Surgitron® device which delivers RF in both bipolar and unipolar fashion. It comes complete with power cord, ground plate, electrodes, footswitch, and instructional manual. There are also some instructional video units supplied by the company but there is little to beat hands on experience.

Launched in the UK in September 1998, the Surgitron® Dual Frequency RF/120 IEC machine is manufactured by Ellman International from New York, USA. The IEC mark stands for European Compliance and this is important as there were some of the original models from California still for sale here a few years ago.

Radiofrequency surgery is the term being used for radiosurgery procedures performed using this Surgitron® specific device, which uses high frequency radiowaves at 4.0 MHz to cause cutting or coagulation in tissues.

It is probably worth getting a smoke evacuator if you can afford it. They are very expensive (almost as much as the unit) but if you are doing a lot of radio surgical procedures or in a confined area they are probably worth it.

Viral filters and activated charcoal filters can be incorporated in the extraction circuit to make the radio-surgery operation almost odourless. It is sensible to wear a surgical mask whenever viral lesions are being removed as there is documented evidence that the wart virus DNA can be liberated during carbon dioxide laser surgery, and it is possible that this can occur with the plume of smoke released during radiosurgery.

The unit itself is an electrical generator connected to the domestic electricity supply that converts the mains voltage (240 volts at 50 Hz) to high-frequency current of 3.8 MHz. It has a switch that will select different waveforms and a passive electrode or ground plate. This small plastic covered plate does not need to make electrical contact with the patient and acts like an antenna. A treatment handle is connected to the generator by a flexible wire and different shaped surgical quality tungsten electrodes are inserted into it. A single wire is used for incision, loop electrodes for cutting, and a ball-ended electrode for haemostasis. There are also fine, bipolar forceps available for precise haemostasis and it is possible to obtain a handle that holds a standard scalpel blade so that the operator can use both conventional cutting as well as radiosection.

Cleaning the electrodes

The electrodes can be steam sterilised in an autoclave, as can the wires, plugs, and antenna baseplate. Furthermore, the electrodes are self-sterilising when used.

However, carbon particles and debris can become adherent to the tungsten wire, by continued use hence reducing the efficiency and causing 'drag'. These can be 'steam cleaned' by setting the unit to cutting waveform and power dial 5. Place the electrodes between two damp gauze pads and activate the unit for about two seconds until some steam is generated. However, most of the electrodes today are disposable after one use.

Be careful!

(1) Pacemakers: Patients with a cardiac pacemaker should probably not be treated with radio-surgery without prior consultation with their cardiologist. The company says that fixed-rate pacemakers are unlikely to experience any problems, but demand-led pacemakers may well be affected and result in arrhythmias. It is better to always ask every patient in advance whether they have a pacemaker.

(2) Inflammatory materials: Because of the risk of flame do not clean the area with an alcohol swab. In fact, it is unnecessary to use any form of skin preparation. Explosion risks exist in the presence of bowel gases and/or oxygen, as they do with diathermy and electrocautery patient.

(3) Electrical shocks and burns: These are usually minor and can be minimised by not allowing any part of the patient to touch any metal and by the operator wearing rubber gloves.

(4) Delayed bleeding can occur and it is advantageous to have the coagulation head nearby: Check the patient is not on aspirin or anticoagulants. Using adrenaline with Lidocaine tends to increase delayed bleeding and can be lessened by applying a solution of 20% aluminium chloride or Monsell's solution on a cotton applicator at the end of the procedure. Regarding bleeding from small haemangiomas or vascular lesions; applying finger pressure for 2-3 minutes is usually effective.

(5) Remember the Pathologist: Too much tissue destruction making histology impossible for the pathologist to interpret. This may be due to incorrect power or waveform setting, or a lesion, which is too shallow. In this case cut off the top with a conventional scalpel and then treat the base with the radio- unit.

(6) Diabetes: Always remember to do no harm and this includes being continually aware of doing radiosurgical techniques on the lower limbs of diabetic patients.

Summary

Radiosurgery is a relatively new atraumatic method of cutting and coagulating soft tissues. During this procedure, tissue to be treated is either removed or destroyed by electrical energy, which is then converted to heat because of tissue resistance.

Unlike electrocautery, the heat is generated in the tissues and hence the actual electrode remains cold. There is no pressure required during radiosurgery and the tissue cells are effectively vaporised in the path of the radiowaves, which causes them to split apart much like a hot wire through polystyrene.

I have used a unit for the past four years in General Practice and find that it can achieve superior results than other conventional microsurgical techniques.

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If you have any comments or suggestions regarding this article, please email clinicarea@consultingroom.com