A Simple Guide to the Hyfrecator 2000

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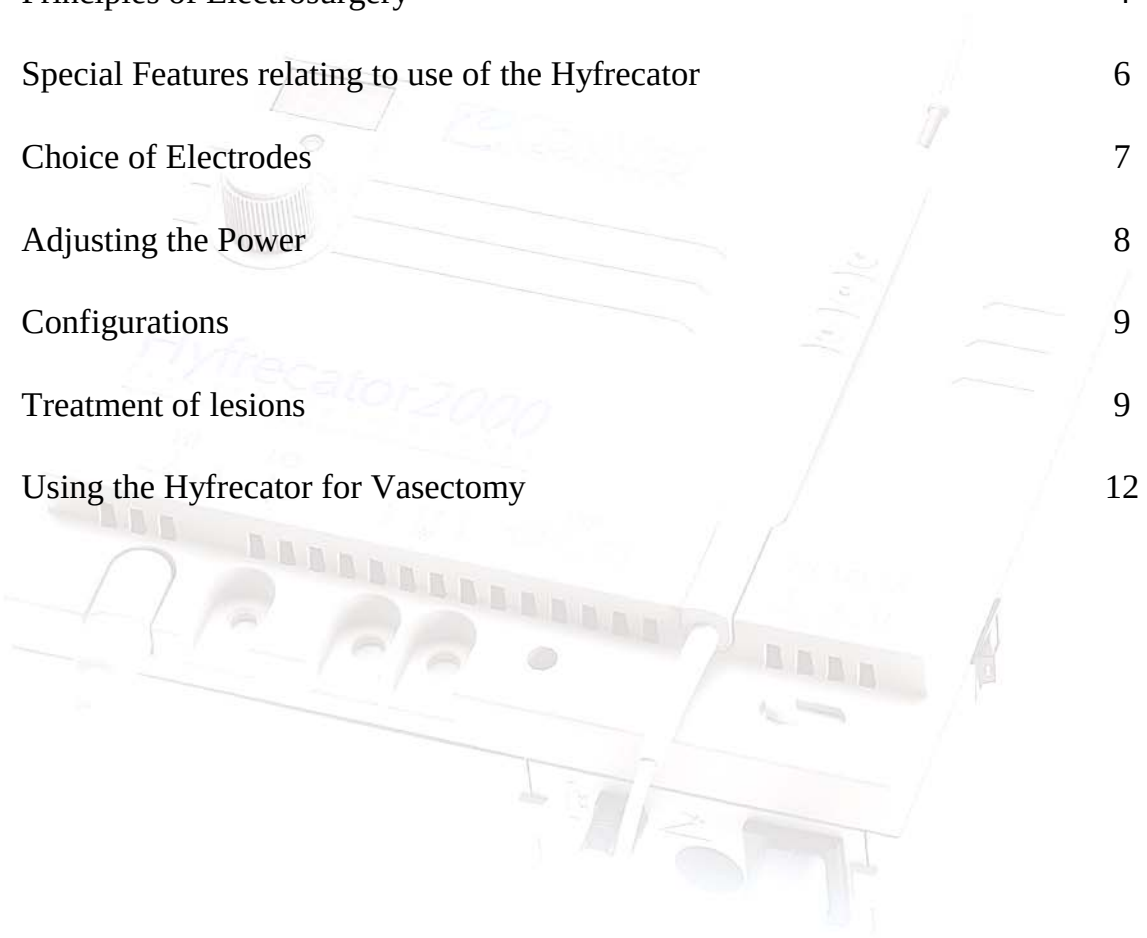

INTRODUCTION

Efficiency and Cost-effectiveness are popular terms for the 1990's but have always meant 'getting the job done' and 'value for money'. In these terms there is little to compare with the Conmed Hyfrecator 2000, the latest and best model in the long line of Hyfrecators which, for more than half a century, have been the most popular electrosurgical accessory for outpatient and office-based surgery.

The Hyfrecator allows precise destruction of all types of cutaneous lesion (both superficial and deep) and controls surgical bleeding simply, quickly and effectively. Bleeding can prolong even minor procedures and increase the risk of haematoma formation, infection and wound dehiscence that may lead to poor cosmetic results.

The Hyfrecator is widely used for outpatient procedures that range from epilation to vasectomy (described later). It is commonly used by Dermatologists in conjunction with curettage for the destruction of small well-defined skin cancers such as basal cell carcinoma and for the treatment of a wide variety of cutaneous lesions.

Other applications include: - Vasectomy (p), Chiropody, Maxillofacial, Plastic Surgery, GU Medicine, Gynaecology, Veterinary.

Cutaneous conditions amenable to treatment with the Hyfrecator include:

Adenoma sebaceum, Angiokeratoma, Benign Moles, Campbell de Morgan Spots, Common viral warts, Fibromas, Filiform warts, Lymphangiomas, Molluscum contagiosum, Plane warts, Pyogenic granulomas, Sebaceous gland hyperplasia, Seborrhoeic warts, Skin tags, Solar keratoses, Spider naevi, Syringomas, Telangiectasias, Venereal warts, Xanthelasmata.

THE HYFRECTOR, ELECTROCAUTERY, CRYOTHERAPY AND LASER COMPARED:

The Hyfrecator is a Surgical Diathermy Unit. It produces a controlled electrical discharge of high frequency and high voltage, which selectively destroys tissue by the passage of electric current. Electrocautery by comparison uses an electrically heated metal 'burner' to destroy tissue through heat conduction. Cryotherapy uses a freezing spray to produce damage to cells, which are then eliminated by natural processes. All three modalities have a place in outpatient surgery and overlap in their uses.

Lasers produce a high power beam of monochromatic light which can be specifically 'targeted' to destroy one component of body tissue - such as haemoglobin or melanin. They are particularly useful for treating diffuse cutaneous malformations such as vascular and pigmented birthmarks. The main disadvantage of lasers is their cost - usually tens of thousands of pounds.

The Hyfrecator, Electrocautery and Cryotherapy units are compared below:

Hyfrecator

Advantages

The Hyfrecator is more versatile and can be used to treat more conditions than any type of electrocautery or cryotherapy equipment. It delivers rapid, precise destruction of all types of cutaneous malformation, including telangiectasia and unwanted hair growth. It can provide controlled tissue coagulation and precise surgical haemostasis using bipolar coagulation. Small lesions can be treated without anaesthesia.

Disadvantages and Hazards

As with electrocautery it can ignite alcoholic skin preparations that should be allowed to evaporate before commencing treatment. Caution is required in patients with implanted cardiac pacemakers.

Electrocautery

Advantages

Simple, robust equipment. Allows destruction of common cutaneous lesions under local anaesthesia. Tip of the cautery can be sterilised by heating to red heat before use. Needle points available for treating spider naevi. Can be used to control skin surface bleeding (and operative bleeding - with some difficulty).

Disadvantages and Hazards

Not a very precise method of treatment. Battery powered equipment often 'runs out' at the time you need it most, more powerful mains powered equipment is bulky and unwieldy. Hot cautery tip can ignite any inflammable material - including dry cotton dressings and alcoholic skin preparations. Treatments always require local anaesthesia.

Cryotherapy

Advantages

Modern cryosprays allow precise delivery of refrigerant with reproducible results. Many treatments can be administered without local anaesthesia as cooling the skin has an anaesthetic effect.

Disadvantages

Liquid nitrogen has to be obtained shortly prior to treatment, or stored in specialised vessels. Unused nitrogen evaporates rapidly. The inflammatory response to cryotherapy is unpredictable and often intense. Injury takes several weeks to resolve and only then can the extent and adequacy of treatment be assessed. Incorrectly handled nitrogen can cause burns. Cryotherapy destroys melanocytes producing an unacceptably white scar in coloured skin.

PRINCIPLES OF ELECTROSURGERY

A technical description of electrosurgical generators requires a vocabulary unfamiliar to most physicians. Voltage, frequency, power, current, current density, capacitative-coupling, dispersive patient return electrode, alternative return pathways, earthing, grounding, modulation, spark-gaps, are but a few of the terms used to describe the functions of electrosurgical generators. The following section is designed to teach the clinician the important principles of electrosurgery and to impart an understanding of the risks and benefits of the technique.

Diathermy (from the Greek Dia - through and thermy- heat) is the heating of tissue by the passage of high frequency current.

Simple batteries produce a direct current that flows from one pole to the other. Mains electricity alternates, with the polarity reversing 50 times per second. The size of current flow is determined by

voltage (the 'push' from behind) and resistance (of the tissue) through which it is trying to flow. The higher the resistance the higher the voltage required to allow current to flow. Direct currents and low frequency alternating currents stimulate muscles including cardiac muscle, which may fibrillate with fatal results. At higher frequencies, however, muscles are not stimulated and the current can be put to therapeutic effect.

The flow of current through tissue causes heating, the higher the current flowing through an area of tissue the greater the heat generated. This heating effect depends on current density i.e. the current flow per unit area of tissue and has important implications in the use of electrosurgery. Medical diathermy, as used by physiotherapists, employs two large electrode plates, which are applied to either side of an injured muscle. A high frequency current then passes between the plates gently warming the intervening tissue. The current density at each plate is very low and the plates remain cool.

Surgical diathermy, however, uses a small active electrode and a large dispersive patient return electrode, (not required with the Hyfrecator). Current density at the tip of the surgical electrode is very high leading to heat generation in the immediately adjacent tissue. This method of using surgical diathermy is referred to as 'monopolar' - because the electrosurgical effect is confined to one electrode. 'Bipolar' electrosurgery uses two small electrodes, as the insulated tips of bipolar forceps, which are applied either side of the tissue to be coagulated. High current density is generated between the forceps tips coagulating the intervening tissue.

The Hyfrecator is a low power surgical diathermy unit designed specifically for outpatient surgery. In comparison with a conventional surgical diathermy machine, it produces a higher voltage output (which matches the high impedance of dry skin) and because of its limited power can be safely used without a dispersive patient return electrode. It also provides a bipolar output for precise tissue coagulation with bipolar forceps.

When using the Hyfrecator three different forms of tissue destruction are possible: 'fulguration', 'desiccation' and 'coagulation'. Fulguration occurs when the electrode is held just above the skin and a shower of sparks play over its surface. This causes carbonisation or charring and the charred tissue acts as an insulator preventing deeper tissue damage. Although it looks more dramatic in use, the tissue destruction produced by fulguration is more superficial than that of desiccation or coagulation.

Desiccation is achieved by placing the electrode in good electrical contact with the skin surface so that no sparks are generated during treatment. This achieves a deeper level of tissue damage but not as deep as coagulation. Coagulation occurs when two electrodes are brought to the tissue with bipolar forceps. The concentrated flow of current precisely coagulates the intervening tissue sealing small blood vessels.

The distinction between fulguration and desiccation is largely artificial - for the purposes of treatment, but the physician should be aware that sparks are associated with more superficial tissue destruction and that good electrical contact is required for deeper tissue destruction. Furthermore, higher power settings are required for desiccation and coagulation and the effect on tissue is less immediately apparent than with fulguration.

Finally, the Hyfrecator may be used in conjunction with a dispersive patient return electrode plate. Under these circumstances the dispersive plate is connected to the dispersive plate connector on the Hyfrecator and the plate held in maximum contact with the patient's skin. The use of the plate increases the efficiency of the system, and until experience is gained the settings of the machine should be reduced. With the use of the return plate it is possible to produce deep monoterminal tissue coagulation.

SPECIAL FEATURES RELATING TO USE OF THE HYFRECATOR 2000

When an electrosurgery generator produces a current it flows from one pole of the machine to the other. Unlike the Hyfrecator most electrosurgery generators are radio frequency-isolated machines which require a dispersive patient return electrode held firmly against the patient's skin to complete the conductive pathway. (The use of a patient return electrode is mandatory for safety when procedures are performed under general anaesthesia).

The Hyfrecator, however, is a ground-referenced machine and does not require a patient return electrode. The active electrode is held to the skin and current returns to the machine by capacitative-coupling with the patient's environment to ground (earth). This is quite acceptable for low-power electrosurgery but can lead to unusual effects as the current seeks the path of least resistance back to the machine. This path includes all that the patient is in contact with -i.e. the couch, attending physician, any other medical equipment etc. If a very good pathway to ground is established then most of the current will take this

route. Furthermore, if this route is established by only a small point of contact then current density at this point may be high enough to produce a spark - leading to swift protestation but little harm in the conscious patient.

In order to prevent this effect grounded devices should not be brought into contact with the patient during operation of the Hyfrecator and the Physician should maintain good contact by resting a hand on the patient's skin (or alternatively not make contact with the patient during the procedure).

Monopolar electrosurgery may interfere with implanted cardiac pacemakers and normally should not be used in their presence. Bipolar coagulation with bipolar forceps is free of this risk.

The Hyfrecator 2000 performs internal self-diagnostic tests when it is first switched on - this is indicated by visual and auditory warnings.

CHOICE OF ELECTRODES

The development of 'Electrolase' disposable electrodes and sterile sheaths for the Hyfrecator handle has eliminated the risk of cross-contamination between patients and many physicians exclusively use Electrolase tips. These are available with a sharp point - for pinpoint procedures such as the treatment of spider naevi and telangiectasias, and with blunt points for most other procedures. They are available sterile for use within surgical wounds, or non-sterile for use on the skin surface.

A range of non-disposable electrodes is available including needle, ball and blade-shaped electrodes, which may be required occasionally for specialised procedures. Hair growth can be treated with fine epilation needles, (disposable epilation needles are also available and require a lightweight handle. Metal hypodermic needles can also be used with an adapter but are too sharp for many applications.

ADJUSTING THE POWER

The effect of surgical diathermy is dependent upon current density, this in turn depends on the output of the machine, the area of contact between the electrode tip and the tissue and the resistance of the return pathway.

The physician must constantly evaluate the electrosurgical effect and position of the electrode and adjust the power settings accordingly. It is useful to experiment with a piece of meat to see the various effects that can be achieved.

Remember that if the length of electrode in contact with tissue is doubled, the area of tissue contact is quadrupled and the power setting must be increased fourfold to achieve the same effect. Much more power is required for desiccation -where the electrode is held in good contact with the tissue, than for fulguration where the tip of the electrode is held above the surface producing a stream of sparks and a much more superficial destruction of tissue.

In order to accommodate the full range of power outputs required for procedures the Hyfrecator 2000 has two output ranges. The low output now delivers up to 20 Watts at 3000 volts; adjustable in increments of 0.1 Watts up to 10 Watts, which allows precise control when working with fine, tipped electrodes. The higher output delivers up to 35 Watts at 8000 volts, adjustable in increments of 1 Watt, and is used for larger procedures and deeper tissue destruction. The bipolar output delivers up to 35 Watts at 3000 volts, in increments of 1 Watt, and is used with bipolar forceps.

A very useful feature, which is new to the Hyfrecator 2000, is the memory for the ‘last used’ power setting in each mode. When the machine is switched on, or switched between modes, the most recent power setting in that mode is selected for the operator’s convenience.

As a general rule the output should be set as low as possible to achieve the effect desired. The output mode is selected - either monopolar low or high outputs or the bipolar mode for use with insulated forceps. The power can be adjusted either on the machine using the rotary digital power dial, or using the switching handle which makes it possible for the physician to adjust the power settings without assistance. The simple universal handle and footswitch may be preferable for very fine procedures - such as epilation and the treatment of telangiectasia where the slightest movement may dislodge the electrode from the area to be treated. The footswitch is also required when using bipolar forceps.

A sticker on the machine refers to its 30s/30s 'Duty Cycle'. This is a licensing requirement. In effect the machine can be run at full output for 30 seconds and then should be allowed to rest for 30 seconds. It

should not be run continuously at maximum output otherwise it will overheat. In practice most procedures use less than half maximum output for 1-3 seconds at a time.

CONFIGURATIONS

The standard Hyfrecator is provided with a switching handle that allows control over the equipment from the handpiece. Sterile plastic sheaths can be placed over the handle and lead for open surgery.

The blunt sterile Electrolase electrode tips are probably most useful, although the sharp tips are best for treating telangiectases.

For very fine work it may be preferable to use a footswitch to activate the machine, eliminating any minor tremor associated with operating the switching handle. Please note that you shouldn't use the footswitch to control the switching handle as this can result in unexpected current leaks - use the simple universal (non-switching) handle with the footswitch. A lightweight handle is also available which takes standard disposable epilation needles.

For precise coagulation of bleeding vessels a pair of bipolar forceps and leads is invaluable, these must be used in conjunction with the footswitch.

Other accessories are available for specialised procedures if you need them.

The Hyfrecator is supplied complete and ready for use and includes a comprehensive operating manual and video to guide new users.

THE TREATMENT OF CUTANEOUS LESIONS WITH THE HYFRECATOR

Don't forget before destroying cutaneous lesions that tissue diagnosis is straightforward and whenever there is any clinical uncertainty of diagnosis a shave or curette biopsy should be taken for histological examination.

General Principles:

Following treatment with the Hyfrecator the skin should be kept clean and moist with white soft paraffin or an antibiotic ointment such as 'Polyfax'. The treated area should be washed twice daily and the ointment applied regularly. This will produce optimal healing of the skin but, as would be expected, the amount of scarring will vary from site to site and person to person and so there is no substitute for treating a small test area initially and assessing the final results before proceeding to a full treatment.

Try to be aware of the effects of the electric current during treatment and remember that although a lot of sparks look dramatic they create a superficial charring which is insulating to heat and electric current and tends to minimise the depth of treatment. For deeper and more effective treatment the electrode tip should remain in good contact with the tissue throughout treatment. The intensity of treatment is greatly increased by the use of the dispersive, patient return electrode. Very superficial treatments can be given without anaesthesia, but the majority requires local or topical anaesthesia.

The following lesions respond well to treatment with the Hyfrecator:

Benign moles.

Under local anaesthesia shave excise the bulk of the lesion. Use light electrofulguration to produce haemostasis and to destroy any remaining protuberant tissue.

Dermatosis Papulosis nigra.

These small warty lesions typically develop on the face of patients of Caribbean descent. Light electrofulguration will destroy them. Plane (flat) warts can be treated in a similar manner.

Epilation.

The fine epilation needle electrode is placed gently down the hair follicle until resistance is met. A light current is passed into the tissue whilst the operator gently pulls at the hair. When sufficient current has been applied the hair becomes loose and is effortlessly plucked from the follicle. This technique can be useful for hair-bearing intradermal naevi.

Facial Telangiectasias.

The blunt electrolase tip is placed directly over the telangiectatic blood vessel and a brief current passed to desiccate and blanch the skin and vessel. A further segment is then treated and so forth until the entire vessel is destroyed. A white streak may be left after healing - and this is particularly visibly if patients have background facial erythema - patients should be warned of this.

Milia, Comedones, Small Cysts.

The skin overlying milia or other inclusion cysts is lightly desiccated which leads to discharge of the contents after a few days. This technique is useful for patients with multiple closed comedones in acne.

Molluscum Contagiosum.

Lightly electrodesiccate the surface of the lesion which will then involute.

Pyogenic Granuloma.

Remove the main bulk of the lesion by curettage or shave excision and electrodesiccate the base.

Seborrhoeic keratoses.

Use high power electrofulguration to soften the surface of the seborrhoeic keratoses, then remove the tissue either by firm rubbing with a cotton gauze swab, or with light curettage. Solar keratoses may be treated in a similar manner.

Skin tags.

Small tags up to 1mm in diameter can be easily treated without local anaesthesia. Larger tags require local or topical anaesthesia. Use a short burst of either electrofulguration or electrodesiccation current to destroy the tag. The treated skin will separate naturally in a few days.

Spider Naevi / Angiomas

Press the electrode tip over the central vessel and pass an electrodesiccating current sufficient to blanch the tissue. Beware that over treatment may leave a small depressed scar.

Syringomas.

These lesions typically occur around the eyelids. Light fulguration followed by curettage or pinpoint electrodesiccation may treat these successfully. Sebaceous gland hyperplasia can be treated in a similar manner.

Viral Warts.

Electrofulguration or electrodesiccation is used to soften the wart prior to light curettage.

Xanthelasma.

Xanthelasma can be surprisingly deeply situated within the skin and it may be preferable to treat them with light electrodesiccation on a number of occasions, rather than attempting to remove the entire lesion in one session.

Vasectomy

Marie Stopes International, a non-profit family planning organisation working in 24 countries has been using the Schuco Hyfrecator since 1976. In Britain (where there are 24 Stopes vasectomy centres) over 60,000 vasectomies have been performed using the Hyfrecator alone to occlude the vas deferens. This technique, pioneered in the early seventies by Schmidt, in the States, is quick, reliable and has fewer complications than traditional ligation techniques with comparable failure rates in the hands of trained and experienced doctors. This method of contraception is over 99% effective. Electrodes to be used are the **716** or **7-221-S**.

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Finally, enjoy using your new electrosurgical companion and don't hesitate to seek advice from more experienced colleagues.
Most Hyfrecator owners are enthusiastic about their machine and will readily swap advice on treatments with you.

Advice on the use of the Hyfrecator and other electrosurgical equipment in patients with implanted cardiac pacemakers.

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Modern implanted cardiac pacemakers are designed to reject electrical interference through the use of bipolar intraventricular electrodes and interference-rejecting circuits. The risk of interference from using electrosurgical equipment is low, but it would be unwise to do so in patients fitted with an implanted cardiac pacemaker without further advice from their Cardiologist or Cardiac Device Physiologist.

The electrical components of an implanted pacemaker may be damaged by electrosurgery in the vicinity of the unit. It is also possible that electrical pulses generated close to a pacemaker unit may re-programme its function.

Patients may be 'Pacemaker-dependent' i.e. their heart beat is entirely dependent upon a pacing signal from the implanted pacemaker. Unwanted electrosurgical interference may suppress the required pacemaker signal leading to asystole and collapse - for the duration of the interference.

Some patients are not dependent upon the pacemaker - it only triggers if the natural heart beat stops: they are at less risk from pacemaker interference.

Finally and most importantly, increasing numbers of patients are now being fitted with combined pacemaker and implantable cardioversion defibrillator devices (ICD's). These devices not only function as pacemakers but are capable of detecting and treating various cardiac arrythmias and, if necessary, of defibrillating the heart should ventricular fibrillation be detected. There is a real risk that a signal generated by electrosurgery may be mistaken by the ICD for ventricular fibrillation and result in unwanted discharge of the defibrillating current with undesirable consequences.

Many patients with pacemakers are elderly and most are unaware of the precise nature of their implanted device, for this reason it is essential that they contact their cardiology service for advice prior to electrosurgical treatment. The Cardiologist or Cardiac Device Physiologist will usually make the device safe for the duration of surgery and check that it has not been damaged afterwards.

For simple procedures in clinic, in patients with pacemakers, electrocautery may be used with complete safety.

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