

REVIEW

COSMETIC TREATMENT OF HIRSUTISM

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Hirsute women may have marked psychological problems.¹ Hirsutism does seriously impair the individual's capacity to establish normal social relationships with her contemporaries and if severe, may retard her psychosocial development.²

Every hirsute women ideally should be investigated. However, often enough this is not practical. Several women after investigations, become candidates for anti-androgen therapy.³ This form of management requires long term compliance and may not be feasible in women of child-bearing age. Moreover, patients on drug treatment still have to remove hairs by cosmetic means, though at increasing intervals.

There are several methods which can be adopted for cosmetic management of unwanted hair. Depilation is the removal of hair at or just below the skin surface, while epilation is removal from the 'root'. The various techniques used for management of hirsutism are shown in Table I.

Bleaching⁴

This method is widely used for masking facial hair and hair on the arms. When repeated often, it may actually inflict sufficient damage to the hair to cause its breakage.

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Table I. Techniques for cosmetic management of hirsutism

I	Bleaching	
II	Depilation	a) Physical : shaving, abrasives b) Chemical
III	Epilation	a) Plucking b) Waxing c) Electric epilation : electrolysis, thermolysis, blend

Basis of hair bleaching : Bleaching of hair is done by oxidising the melanin pigment in the hair. The natural hair colour depends not only on the quantity of pigment present in the hair but also on the size and distribution of the pigment. Microscopic examination of the hair shows that hair pigmentation is due to pigment granules (light brown to deep black) present in the cortex, as well as due to a diffuse back-ground pigmentation (pale yellow to brownish). If the bleaching of hair is followed phase-by-phase by examining hair sections, it is seen that as bleaching progresses, the number of pigment granules decrease, while the diffuse pigmentation becomes more apparent - this is because the granules, being more susceptible to oxidation, are solubilized.⁴ Bleaching causes depolymerisation of melanin, giving rise to carboxylated derivatives which are soluble in an alkaline pH and can be eliminated by rinsing.⁵

Formulations : Hair bleaching systems generally contain hydrogen

peroxide along with ammonia (available as liquid ammonia or ammonium persulphate). The 2 components, which are dispensed separately, are mixed just prior to use and applied to the area to be bleached. The 'bleach' is rinsed off after about 30 minutes. It is useless to extend the reaction time, as the partially decomposed hydrogen peroxide has no further bleaching effect and increasing the proportion of ammonia increases the likelihood of skin irritation.

There are a variety of product forms available : (a) solutions, (b) bleaching powders, (c) bleaching paste, and (d) creams. A simple 'home use' system would be to use hydrogen peroxide (20 volumes) with 20 drops of ammonia (household ammonia or ammonia water) for every 25 ml of the peroxide. This solution, however, tends to run. Addition of talcum powder or Fullers' earth gives a paste with increased adherence. Creams can be made by adding emollients. The evaporation of ammonia is retarded, thereby improving the quality of bleach.

Side effects : Irritant reactions are not uncommon, especially if excess of ammonia is used : it is preferable to carry out a preliminary test - if irritation occurs within 60 minutes, the strength of the components and duration of application should be reduced. Ammonium persulphate is also a potential sensitiser.⁶ It releases histamine causing facial itching and swelling - this is more common in individuals with dermatographism.^{7,8}

Depilation

Shaving : Though shaving, especially on the face, is unacceptable to

some women as being too masculine, a majority of women are happy to shave 'hairy parts of their body'. Shaving is the easiest, cleanest and cheapest way of removing superfluous hair. There is no scientific basis for the common belief that shaving stiffens hair or increases its pigmentation or growth.⁹ However many women develop folliculitis during regrowth, sometimes due to infection with *Staphylococcus aureus*.¹⁰

Shaving is usually done either with a safety razor or a twin razor blade. Use of wetting preparations simplifies the task by softening the hair due to absorption of water. For most women lathering the area with soap and water is adequate. Some women use hair softeners containing soaps and synthetic surfactants and urea.¹¹ These soften the hair, lubricate the passage of razor over the area and support the hair.

Abrasives : Abrasives remove hair superficially. The commonest one in use is the pumice stone. Sand paper covered mittens and gloves are the recent product forms.

Chemical Depilation : Chemical preparations for removal of unwanted hairs have been known for thousands of years. Among the earliest chemical depilatories was rhusma, a mixture of quicklime and arsenical pyrites used by dancing girls.¹²

Basis of use : Depilatory preparations contain an alkaline reducing agent as the active component.¹² This causes the hair fibres to swell and produces a cleavage of the cystine bridges between adjacent polypeptide chains as a preliminary to the complete degradation of hair.

Formulations :¹² Sulphides and stannites, widely used in the past, have now been largely superseded by substituted mercaptans. Preparations are available in foam, cream, liquid and aerosol forms.

(a) Sulphides produce rapid depilation but are unsatisfactory because of their potential for irritation and their odour. The odour is due to liberation of hydrogen sulphide particularly on washing. It is, therefore, necessary to remove the product with a spatula before washing the area. Depilatories containing strontium sulphide, a much milder depilatory, are still available especially for use for under-arms, pubic area and the legs. Strontium sulphide should not be used on the face.^{10,12} This works effectively within 3-5 minutes.

(b) Stannites, popularised in thirties had good depilatory properties, but were unstable, forming stannates in water-based solutions despite the use of stabilisers.

(c) Substituted mercaptans in the presence of alkalis form the basis of virtually all modern chemical depilatory preparations. They are slower in action than sulphides, but cause much less irritation and can be even used on the face.

Thioglycollates, are used in a concentration of 2-4% at a pH of 12.5.¹² At this concentration and pH they produce depilation in 5-15 minutes. At lower concentrations the speed of action is reduced while nothing is gained if the concentration of thioglycollate is raised above 4%. Of the thioglycollates, the calcium salt is most favoured as it is the least irritant. The pH in the solution of

calcium thioglycollate is maintained by an excess of calcium hydroxide which also prevents the excess alkalinity which can irritate the rate skin.¹⁰ Attempts have been made to accelerate the rate of depilation by thioglycollates by either incorporating substances like urea which cause swelling of the hair or by increasing the temperature. These methods have not been particularly successful.¹²

Since thioglycollates attack keratin, both of the hair and the skin, they may have an adverse effect on the epidermis if the manufacturers' recommendations are not followed; it is generally suggested that a small area should be tested in order to prevent extensive irritant reactions in susceptible individuals.

(d) Keratinase based depilatory preparations have also been developed. Keratinase, an enzyme, has been isolated from *Streptomyces fradiae*.¹³ These preparations do not have an unpleasant odour and are non-irritant but are not particularly effective.

Epilation

Plucking :¹⁰ Plucking (using either a tweezer or thread) is a common method of removal of unwanted hair in the region of the eyebrows, the upper lip and stray hair from face and areolae of the breasts. Interestingly, plucking stimulates the root into the anagen phase and so the shaft soon grows through the epidermis after a brief delay.

Waxing : Waxing is one of the oldest methods available to remove unwanted hair. It is more often used by beauticians than at home for removing hair from the extremities and sometimes from the face.¹ The major disadvantage of

waxing is that it can be used only to remove hair which is at least a few millimeters long.

Formulations : For many years preparations for waxing have consisted of resin and beeswax. Various agents like mineral oil, camphor, antibacterial agents and local anaesthetics are added to enhance the effect of wax, to reduce the pain of waxing and to decrease the chance of infection. A formula based on caramelized sugar, lemon juice and glycerine is easily prepared and is used extensively in beauty parlours.¹⁴ These formulations all require preheating after which the wax is applied to the part to be treated, allowed to cool, and then stripped off with strips of cloth taking the embedded hair with it.¹⁵ Cold wax which is primarily for 'self use' is based on a mixture of glucose and zinc oxide and does not require preheating.¹²

Several refined techniques of application of the wax have been developed. A flexible backing strip is now available. Another new formulation contains a rubber solution in which as the solvent evaporates, a rubber film forms and this can be stripped off.¹²

Side effects : Some women find waxing painful and the skin may look awfully angry in the first 24-28 hours after waxing. I have noticed that almost half of women develop folliculitis of the area, 2-3 weeks after waxing.

Electrosurgical Epilation : Electro-surgical epilation is a safe and permanent method of removing unwanted hair. Electric epilation can be done either using a direct current (electrolysis), an alternating current (thermolysis) and sometimes using a combination of direct

and low-intensity high-frequency alternating current (blend). Today methods using direct current (DC) have been largely replaced by those using alternating current (AC) and by the blend technique.

Indications : Before recommending electric epilation, the physician should decide if the patient really has superfluous hair. The dermatologist should be aware that some races and families are excessively hairy. Moreover in trichomania, the patient's problem is actually due to a poor self image and not due to excessive facial hair. Removal of a small amount of hair is not likely to restore the emotional balance in these patients - the problem would just reappear in another form.¹⁶ In all patients, who look genuinely hirsute, organic causes of hirsutism should always be ruled out.

Electric epilation is indicated most frequently in the following situations : (a) excessive terminal facial hair, (b) isolated large terminal hair on the breasts and areolae, (c) terminal hair on moles that are to be removed by shave biopsy, and (d) hair that is present in the skin graft obtained from a hair-bearing area used to cover a defect in a non hair-bearing area.

Basic principle of electric epilation: Electric epilation relies on the destruction of germinative hair cells and this prevents hair growth permanently. Controversy exists regarding the portion of hair follicle that must be destroyed in order to remove hair permanently. Earlier animal studies suggested that it was necessary to destroy the upper third of the hair follicle. If this was not done hair could regenerate from the dermal connective tissue sheath and the inner and outer root sheaths.^{17,18}

Subsequent human studies utilising biopsy specimens showed that the lower portion of the follicle must be destroyed along with the dermal papilla and that the infundibulum and sebaceous glands could also regenerate themselves.^{19,20}

(a) **Electrolysis** : In electrolysis by DC, chemical decomposition occurs in the tissues at the negative electrode or cathode (the needle in this case). Electrons are added to water to form hydroxyl ions and hydrogen gas within the hair follicle. The hydroxyl ions react with and decompose the follicular tissue. At the positive electrode or anode, electrons are removed from the chloride ion to form chlorine gas - this enters into equilibrium with water to form hydrochloric acid and oxygen. In electrolysis the positive pole is a moistened pad that is pressed against the patient's palm. Since the surface area of the pad is large, the concentration of hydrochloric acid formed at the palm is not clinically significant.²¹

(b) **Thermolysis** : In thermolysis, the tissue is destroyed by a combination of coagulation necrosis from the heat generated by the high-frequency AC and the resulting inflammatory reaction about the tissue.²¹

(c) **Blend** : In the blend technique, electrolysis and thermolysis are combined in the same apparatus by employing both DC and AC. Theoretically, this method has the advantages of both electrolysis as well as thermolysis in that the hair is subjected to both chemical and thermal destruction. However, it is slower than thermolysis.²¹

Thermolysis can be either uniterminal or biterminal. Uniterminal

thermolysis uses only 1 electrode, without the use of a grounding electrode. The patient's body provides the electric capacitance to allow sufficient current passage through the needle to destroy follicular tissue. Biterminal thermolysis requires the placement of a grounding electrode. Uniterminal thermolysis is currently the favoured technique for epilation.²¹

Epilation needles : Several types of epilation needles are available : either stainless steel or platinum needles are commonly used. These may either have a fine point or have a rounded tip which prevents penetration of the follicular wall by the needle during epilation. In some machines, a tweezer device has replaced the platinum wire as the active electrode. This grasps the hair close to the skin surface, and a slight tension is applied in the direction of the hair growth. Once the hair has been treated, it will slip out painlessly, and there is little chance of scarring. The basis of this technique is that hair has a high resistance and so it acts as an insulator. The tweezer and dermal papilla serve as electric plates. Heat is generated, because of the resistance produced at the matrix-papilla interface resulting in coagulation of the papilla.²²

Technique :²¹ Electric epilation is a time consuming procedure, so it is important that both the operator and the patient should be positioned comfortably. Most patients can usually be treated without a local anaesthetic. Good lighting is essential and most operators use some method of magnification.

After local cleaning, the skin to be treated is stretched to open up the

follicles. The needle is inserted into the follicle parallel to the shaft of the hair. The angle of insertion is usually not perpendicular to the skin but is slanted at an angle between 15°- 60°. The needle should slide in smoothly. Pain or bleeding indicates that the follicular wall has been pierced. The needle should be inserted upto the dermal papilla - this is where the needle meets resistance. There should, however, be no pain.

The correct strength of current is then applied. This depends on the area being treated, the type of hair being epilated and also on the patient. The current should be of a sufficient intensity to destroy the lower portion of the follicle as well as the papilla. However, if the intensity of the current is very high not only does the procedure become painful, but the chances of scarring also increase. While passing the current, the inserted electrode should not be moved, because this results in increased pain, and if close to the skin surface it may cause undesirable scarring. In **electrolysis**, after about 30 to 60 seconds, tiny white bubbles of hydrogen gas appear around the base of the hair. The hair can then be easily removed from the follicle using a pair of forceps. Contiguous hair should not be removed in order to avoid excessive scarring.

The current in **thermolysis** can be applied either by the manual technique or the "flash" technique. In the manual technique, a low intensity current is used over 20-30 seconds. The longer duration of treatment allows for greater heating and a higher probability of hair destruction. In the flash technique a higher intensity of current is delivered for

less than 1 second. Several pulses may be necessary to cause hair root destruction. The flash technique is less painful. Success rates of the two delivery systems, however, have not been critically evaluated.²¹

After the current has been passed the hair is removed with a pair of fine forceps. If the hair has been adequately treated, it should slide from the follicle without resistance.

The number of hairs that can be removed at one sitting depend on several factors. A skilled operator can remove as many as 150-200 hair in a hour while a fussy patient can greatly hamper the rate of removal. The epilation rate also depends on the amount of follicular distortion and scarring produced by previous skin disease or treatments. A thinning technique can be used for large areas - in this the coarsest hairs are treated first. A predetermined current suitable for the type of hair in a certain location of a particular patient is selected using the automatic controls. The operator can then remove the hair more efficiently. In order to lessen the chances of scarring the hairs should be atleast 4 mm apart. With repeated treatment a gradual thinning is produced.

Results of electric epilations : On an average 15-25% of hair epilated regrow. This is due to several factors : (a) the phase in the hair cycle at the time of treatment - early anagen hair is not visible on the skin and hence is missed on treatment, while telogen hair does not allow access to the papilla, (b) if an inadequate current is applied, the dermal papilla will regenerate and (c) distorted follicles do not allow proper application

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It has been noted that hair which regrows after high-frequency diathermy is of a smaller diameter than which regrows after galvanic current electrolysis and is more likely to be dysplastic and dystrophic. Such hair is easier to retreat.²³

Complications : Most patients experience some pain during electric epilation and this is more with thermolysis especially when the manual technique is used (Table II). All patients develop some degree of erythema and oedema a couple of days after epilation, but these usually resolve within a week. If the electrode tip is not positioned correctly or if the current strength is too much, superficial erosions and crusts form and may eventually lead to multiple pitted

follicular scars. The chances of scarring are less with electrolysis. The chances of scarring are increased if there is secondary infection. In dark skinned individuals, the possibility of post-inflammatory hyperpigmentation or hypopigmentation is a distinct possibility. Hypertrophic scar and keloids can occur in those with a predisposition. Tattooing is a well recognised complication when epilation is done using steel needles.²⁴

Transmission of hepatitis B infection, herpes simplex and acquired immune deficiency syndrome is a possibility and dry sterilisation of epilation needles has been recommended.²⁵ Most operators, however, use 70% alcohol for sterilising the needles. High frequency electroepilation can also interfere with pacemakers.²⁶

Table II. Comparison of results of epilation by electrolysis and thermolysis

	Electrolysis	Thermolysis
Speed	Slower	Faster, allows treatment of large areas
Pain	Less painful	Painful
Scarring	Less	More
Regrowth	More Hair which regrows has normal diameter	Less Thinner hair diameter Dysplastic and distorted hair

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