Laser facial hair removal protocol and key consultation considerations

Abstract

Excessive facial hair in women can cause significant distress and may contribute to a reduced quality of life for those who are affected. Although there are a multitude of mechanical options used for hair depilation, over the years lasers have proved to be the most effective long-term option. However, the British Association of Dermatologists (BAD) recommends that facial hair removal should be carried out in specialised clinics by trained practitioners, as favourable treatment outcomes and the reduction of side effects is dependent on understanding how lasers work, choosing the appropriate parameters and using a suitable machine for each individual's needs. This article presents a facial hair removal treatment protocol from a clinical laser nurse perspective.

Key words

▸ Laser ▸ Hair removal ▸ Hirsutism ▸ Polycystic ovary syndrome ▸ Quality of life

Excessive facial hair (hirsutism) is a common problem for many women and often has a negative impact on their quality of life (Housman et al, 2004). It is defined as an androgen-dependent, male pattern of hair distribution in women and is typically measured using a scoring system such as the Ferriman-Galwey (Newson, 2010). Excessive facial hair can be treated using a variety of methods, however the most efficient, long-term treatment for this indication is laser hair removal.

Lasers have been used since the mid-1990s for the purpose of hair depilation, where the treatment was initially only available in a few clinics and procedures were very expensive. The first lasers used for hair removal were the ruby (694 nm) and alexandrite (755 nm) lasers, but with the introduction in the later years of light-based machines using broad-spectrum intense pulsed light (IPL) (590–1200 nm), along with changes in laser regulations, such treatments expanded into aesthetic salons and the price of treatments became affordable. Nowadays, the majority of skin types can be treated safely and light-based hair removal is one of the fastest growing, non-surgical treatments in the US and Europe (Haedersdal et al, 2011).

However, despite these hair removal treatments being safe and effective, the inappropriate use of lasers have been carried out by both physicians and non-physicians (Moseley, 2014) and recommendations have been made that the key essentials should be training and competence and that laser practitioners should belong to a registered profession (Department of Health, 2013). Proper patient selection and preoperative preparation, an understanding of the principles of laser safety, experience with treating facial hair with a variety of lasers/light devices, and a thorough understanding of laser-tissue interactions, are also vital to ensure safe and efficient results while minimising risks (Ibrahimi et al, 2011). Health professionals having acquired the above skills are therefore in a good position to carry out treatments for hair removal. This paper will focus on facial laser hair removal procedures carried out by laser nurse practitioners.

Causes of excessive facial hair

Excessive facial hair could be a result of hormone imbalance, may be idiopathic (no explained cause), or can be a family trait (particularly in families with Mediterranean, south Asian or middle Eastern ancestry) (Azziz et al, 2004). The majority of endocrine causes for hirsutism (75%) are linked to polycystic ovary syndrome (PCOS), which affects 4–8% of the female population and is the most common endocrine abnormality in women of reproductive age (Azziz et al, 2004). However around one half of hirsute women have idiopathic hirsutism, which develops without the presence of excess androgen or any underlying medical condition(s) (British Association of Dermatologists (BAD), 2006). The incidence of hirsutism is estimated at 5–15% of the reproductive female population (Guidelines Working Party, 2005).

Medical treatments

In its 2008 guidelines, The Endocrine Society recommends that, following tests, premenstrual women suffering from moderate-to-severe excessive facial hair should take oral contraceptives (Martin et al, 2008). If the response to this medication is suboptimal, this should then be followed by antiandrogen drugs after 6 months (Martin et al, 2008). For menstrual dysfunction and insulin resistance, oral contraceptive pills or



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insulin-sensitising drugs (e.g. metformin) can also be prescribed (Johnson, 2014).

Lifestyle changes

Hirsutism varies with both ethnicity and degree of obesity (Azziz et al, 2004). Obesity has been found to increase androgenism and hirsutism independently and by exacerbating PCOS (Teede et al, 2010). Lifestyle change is therefore the first line of treatment in the management of PCOS in women who are overweight. As little as 5–10% weight loss and daily exercise has been shown to have significant clinical benefits, improving psychological outcomes and associated symptoms (Galletly et al, 1996). For this reason, prevention of weight gain should be emphasised to all patients with PCOS, regardless of their body mass (Galletly et al, 1996).

Topical treatments

Applied twice daily, eflornithine cream (Vaniqa, Almirall Limited) is licensed to treat hirsutism, specifically presenting on the face (Guidelines Working Party, 2005). It works by inhibiting the rate-controlling step in the production of putrescine in active hair follicle cells, slowing the rate of hair growth and making hair less visible (Lapidoth et al, 2010). Its long-term use has been reported to be safe (Hickman et al, 2001); the most frequent adverse reaction is a mild acne-like eruption, but there is no worsening of pre-existing acne.

Mechanical and cosmetic treatments

There are a multitude of mechanical treatments, all of which vary in their effectiveness, discomfort and cost, including shaving, tweezing, electrolysis, waxing, epilation and laser hair removal. Although shaving hair on the face may not be acceptable to some women (as it is perceived as a male activity), waxing may cause ingrown hairs, and epilation cream may cause irritation, the advantage of these methods is that they are cheap and easily accessible. In contrast, electrolysis offers a more permanent hair removal option by inserting a fine needle into the hair follicle and using electricity to destroy it (Casey and Goldeberg, 2008). Electrolysis is suitable for small, localised regions of hair growth and side effects are oedema, erythema and scarring. Electrolysis is a more permanent method of hair removal but courses can be costly and lengthy (Burns et al, 2010). Evidence supports the use of electrolysis for permanent hair removal in localised areas, and lasers (particularly alexandrite and diode) for permanent hair reduction (Somani and Turvy, 2014). *Figure 1* shows scarring on a 38-year-old woman's chin as a result of electrolysis and plucking.

Laser treatments

Although laser treatments are more expensive, they cover a larger surface area in one treatment and have quickly become the treatment of choice for the removal of unwanted hair (Casey and Goldeberg, 2008); however the recommended treatment parameters remain vague. Laser hair removal aims to destroy the hair root permanently by focusing on hairs that are in the anagen stage, targeting the melanin in the hair shaft and the bulb of the hair (Patil and Dhami, 2008). The procedure is based on the ability of melanin in the cells of the hair follicle to convert the energy emitted by the laser into heat, thereby giving rise to the local destruction of hair follicle (Styczynski et al, 2008).



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Figure 1: A 38-year-old hirsute woman with white and black hairs on her chin presenting with scarring and irritation caused by electrolysis and plucking

Laser hair removal allows for hair-free periods and thins the hairs, however it does not provide permanent hair removal (particularly for facial hairs) for women with an underlying medical condition. Laser hair removal is also rarely available on the NHS and may be expensive as several treatments are needed every couple of months. This procedure is not effective on blonde or white hairs.

The BAD (2006) recommends that facial hair removal using a laser should be carried out at a specialist clinic by an operator who is properly qualified and has access to medical clinicians. The British Medical Laser Association (2014) also advises that such clinics should have access to a laser protection advisor. Patients for whom excessive facial hair contributes to a compromised quality of life may benefit from core nursing skills such as empathy and reassurance. Alternative treatments should always be discussed if laser treatment is not appropriate for the patient in question. This may be the case for those with finer, lighter hairs and for patients who cannot afford the procedure.

Consultation considerations

Before starting treatment, practitioners must carry out a thorough consultation with patients to assess their individual needs and ensure an appropriate laser is used.

Taking medical and treatment history

At consultation, the patient's individual needs are assessed, treatment options are discussed and any ques-

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tions the patient has are answered. Sunscreen and/or sun avoidance is universally recommended before the procedure because melanin is the principle chromophore for laser hair removal (Casey and Goldeberg, 2008). Moreover, no plucking, waxing or electrolysis should be performed before treatment. Laser goggles designed for the specific wavelength emitted by the light source must be worn at all times during treatment to avoid injury to the eyes. *Table 1* lists some of the aspects to address at consultation.

Assessment

Assessment at the time of consultation should cover:

- Relevant medical history, including allergies and medications being taken
- Existing and previous methods of dealing with excessive hair, along with their frequency and any side effects. The responses to this will create a basis against which the patient's progress can be monitored
- Baseline photos taken with the patient's consent
- Number of treatments, outcomes and potential risks
- Managing patient expectations
- Obtaining a signed informed consent form.

When discussing treatment outcomes, practitioners should take into account the patient's skin phototype and hair characteristics, as well as the areas to be treated and any underlying medical condition(s). Contact information should also be given to the patient should he or she have more questions or concerns. The price of the treatment should be clearly communicated at this stage.

Expected treatment outcomes

A review of 11 randomised controlled trials involving 444 people concluded that certain lasers (alexandrite and diode) offered 50% improvement up to 6 months post laser treatment (Haedersdal and Gotzsche, 2006).

Table 1: Elements of consultation: communication, records, referrals

Element	Considerations
Communication	Verbal and written information Advice Reassurance Price
Records	Medical history, allergies, medication history Skin phototype assessment Previous treatments and methods employed to remove the hair Quality of life/limitations to social life Consent form explained and signed Baseline photos
Referral	To specialists (e.g. endocrinologist, dermatologist, dietitian)

However, there were limited results for IPL and other lasers. Haedersdal and Gotzsche (2006) recommended further research to determine long-term results.

McGill et al (2007) studied 60 PCOS patients who were suffering from facial hirsutism, who had six laser treatments. Following treatment, the number of hairs decreased by 30–40%, which is less than in patients who do not have PCOS; however, 95% reported being 'very satisfied with the treatment' and the effect was sufficient to change patients' lifestyle and increase their self-esteem.

Patients with darker skin can also benefit from increased numbers of treatments owing to the need to use reduced fluence, a longer wavelength and increased skin cooling to protect the skin from potential side effects (Alai et al, 2009). It is therefore important to assess each individual case and give patients realistic expectations; this will ensure a high satisfaction rate is associated with the treatment. However, carrying out a skilful prediction of treatment outcomes will reflect both the practitioner's clinical experience and his or her understanding of how lasers work.

Adverse events

Erythema (redness) and perifollicular oedema (inflammation around hair follicle) are expected reactions to laser hair removal (Sanchez et al, 2002). They are caused by the heat absorbed by the melanin in the hair and in the skin and can be addressed by applying cold packs during and immediately after treatment (Willey et al, 2007). Changes in skin pigmentation (e.g. hyperpigmentation and hypopigmentation), scabbing and blistering are undesirable outcomes which may develop into scars (Breadon and Barnes, 2007). To reduce further stimulation of the melanocytes it is reasonable to conclude that sun avoidance would reduce the risk of post-inflammatory pigmentary changes. Some authors have recommended sun avoidance for up to 3 months post laser treatment (Drosener and Adatto, 2004) to minimise additional inflammation of the treated area; however, there are no formal recommendations regarding sun exposure before and after laser treatment (Casey and Goldeberg, 2008).

One risk when treating hairs on the face is paradoxical hair growth (hypertrichosis). This can present in a number of patients and research has demonstrated an association with Mediterranean skin type. The incidence of hypertrichosis has been reported to be from 0.6% (Alajlan et al, 2005) to 10.5% (Willey et al, 2007). Subtherapeutic thermal injury may cause induction of the hair cycle, particularly on face and neck (Willey et al 2007). Suboptimal energy seems to stimulate the cells responsible for normal follicular cycle, and induce longer, thicker hairs as a consequence of accelerating the transition from vellus to terminal follicular hair (Willey et al, 2007). A more aggressive treatment approach is recommended using higher energy in combination with cold packs to reduce the risk of adverse reactions (Willey et al, 2007).

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Lasers and skin phototype

Lasers should be used according to the patient's skin phototype, which can be assessed using the Fitzpatrick (1975) scale. With the advent of longer wavelength, longer pulse durations and efficient cooling devices, lasers can be used safely for the majority of skin phototypes. All devices may be used in patients with light skin (phototypes I–III), however the alexandrite laser (755 nm) is the most appropriate for lighter skin and finer hairs (Sanchez et al, 2002). The two wavelengths for laser hair reduction on darker skin types are the diode (810 nm) and neodymium: yttrium-aluminium-garnet Nd:YAG (1064 nm) (Sanchez et al, 2002). Ruby lasers are rarely used these days due to higher risk of side effects.

Each laser has a cooling system which can be by contact, cold spray or cool air and must be tested before treatment as per the manufacturer's advice. The cooling system protects the epidermis and allows the heat to be absorbed by the target chromophore, while protecting the surrounding areas. Using active cooling during laser hair removal limits heat accumulation in the epidermis, thus minimising collateral damage and reducing discomfort to the patient. Moreover, the use of a cooling system permits delivery of higher fluences needed to an effective epilation. Cooling methods commonly used include gel cooling, cryogen cooling, contact cooling and forced air cooling (Motta, 2014).

Laser treatment protocol

Lasers and non-coherent light sources have been introduced to cause damage to hair follicles on the basis of the principles of selective photothermolysis (Anderson and Parrish, 1983). For selective thermal damage of a pigmented target structure to be achieved, sufficient fluence at a wavelength preferentially absorbed by the target must be delivered for a time that is equal to or less than the thermal relaxation time of the target (Anderson and Parrish, 1983). Treatment outcomes are dependent on the patient's characteristics, the laser used and the practitioner's understanding the principles of selective photothermolysis.

Although there is some discordance regarding the appropriate number of treatments, most authors agree that, regardless of the laser used, multiple treatments are usually required to produce satisfactory results (Lepselter, 2004). In the guidelines set forth by the European Society for Laser Dermatology, Drosner and Adatto (2005) recommended 3–8 treatments. The ideal treatment interval remains a matter of debate; Bouzari et al (2005) suggest that a shorter treatment interval is more effective. Drosner and Adatto (2005) also recommend treatments every 4–8 weeks. Taking into account the above, Casey and Goldesberg (2008) recommended interval of 6–8 weeks, which may vary depending on the region of the body that is being treated.

Each treatment takes about 15 minutes and is well tolerated without any local anaesthesia. The area treated can be red in appearance for up to an hour, but make-up can be applied straight after the treatment. Cold compresses must be used to reduce the risk of side effects.

Patch test

It is good practice to do a patch test on the treatment area before starting the treatment and indemnity insurance will require this test to be carried out at least 24 hours before proceeding with treatment. The parameters of each laser are chosen to obtain efficient treatment with minimal side effects, taking into account skin type (using the Fitzpatrick scale) and hair colour, thickness and density, by manipulating three variables: wavelength, pulse duration and fluence (Patil and Dhami, 2008). Areas with thicker, denser and darker hairs will need to be treated with lower fluencies and longer wavelength, while finer, lighter and sparse hairs will need an increased fluence and shorter wavelength.

Skin preparation

Any make up and impurities should be removed before treatment to avoid absorption of heat by any particles that are not hair. Hairs will also need to be shaved or cut short before treatment (Casey and Goldeberg, 2008).

Setting the laser parameters

Spot size refers to the diameter of the laser beam on the skin (Patil and Dhami, 2008). For facial hairs, a diameter of 10–15 mm is most appropriate and the larger spot size of 18 mm should be used on larger areas such as the back and legs. Using a larger spot size reduces dermal scattering, leading to greater depth of penetration of the beam and a lower threshold fluence (Halachmi and Lapidoth, 2012). For sensitive areas such as upper lip, the spot size should be smaller than on the rest of the face to reduce discomfort, as larger spots cause more pain than a smaller spot size at an identical fluence (Eremia and Newman, 2000).

The duration of each pulse is measured in milliseconds and is adjusted according to the thickness of hair. The root of an extra coarse hair will never be destroyed, however high the energy level is set to, if a shorter pulse is used (Patil and Dhami, 2008). Therefore, the pulse duration should be primarily guided by the size of the chromophore and only secondarily by the competing chormophore. Whereas fine hairs (e.g. on the upper lip) will need a shorter pulse duration, coarser hairs (e.g. on the chin) require a longer pulse duration. By choosing an appropriate pulse duration, a smaller or a larger target having the same chromophore can be selected (Patil and Dhami, 2008). As a general rule, the larger the chromophore, the longer the thermal relaxation time, as large objects take a longer time to cool.

Fluence is the amount of energy applied per treatment area and is measured in joules/cm^2 (Patil and Dhami, 2008). The fluence of a laser should be tested at lower settings and increased until the desired outcome is observed as advised by the manufacturer. For areas of high density and with coarse hairs (e.g. chin), the fluence should be lower then for areas where hair is sparse.

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Figure 2: A 43-year-old woman with excessive hair on her chin

Repetition rate is the number of pulses per second and measures the speed of the treatment in hertz (Hz) (Patil and Dhami, 2008). The repetition rate will be set in line with the patient's skin type, density of hair and the skill of the practitioner.

Combining laser and topical treatments

For patients who are resistant to laser treatment or have reached the stage where hairs are fine or some hairs are white, combining laser hair removal with a topical treatment will be most beneficial (Burns et al, 2010). *Figure 2* shows a hirsute woman that would benefit from a combination of treatments. Eflornithine cream applied twice-daily is licensed for use of hirsutism, specifically on the face (Guidelines Working Party, 2005); however, this will need to be prescribed by a medical practitioner. Although eflornithine cream can be recommended in combination with laser therapy, it should be stopped 3 days before and 3 days after laser treatment (Hamzavi and Owen, 2006). One of the key benefits of using topical eflornithine is that it can be used on vellus hairs, lighter and thinner hairs, and salt and pepper hairs, for which a laser is less effective (Lapidoth et al, 2010). This can increase the time between laser treatments, however it will take a couple of months of daily use for patients to see results and its effects only last while the cream is being applied.

Conclusion

Excessive facial hair is a common problem for many women and can have a significant impact on their quality of life. Laser hair removal is the most efficient method of long-term hair removal available, however outcomes will be dependent on the skill of the practitioner in choosing the correct parameters and the appropriate machine. Multiple treatments will be needed and combining laser hair removal with topical treatment can render best results in some patients. It is important to note that losing weight can also reduce excessive facial hair in obese women with PCOS. Giving patients realistic expectations based on individual characteristics will increase satisfaction with the treatment and its outcomes. JAN

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