Perspective

Laser hair removal for genital gender affirming surgery

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Abstract: Genital gender affirming surgery (GAS) involves reconstruction of the genitals to match a patient’s identified sex. The use of hair-bearing flaps in this procedure may result in postoperative intra-vaginal and intra-urethral hair growth and associated complications, including lower satisfaction with genital GAS. Despite the significant increase in genital GAS within the past 50 years, there is limited data regarding hair removal practices in preparation for genital GAS and notable variation in hair removal techniques among dermatologists and other practitioners. We present a literature review, recommendations from our experience, and a practical laser hair removal (LHR) approach to hair removal prior to genital GAS.

Keywords: Gender dysphoria; hair removal; laser; sex reassignment surgery

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Introduction

Genital gender affirming surgery (GAS) involves reconstruction of the genitals to match a patient’s identified sex. The use of hair-bearing flaps in this procedure may result in postoperative intra-vaginal and intra-urethral hair growth (1). This undesirable side effect is associated with irritation, infections, hairball and calculi formation, and ultimately a lower patient satisfaction with genital GAS (2-4). Because genital GAS aims to treat gender dysphoria—a condition diagnosed and deemed treated by self-reports (5-7)—addressing patient satisfaction is critical.

To prevent the unwanted hair growth and associated complications, genital GAS has become a recognized indication for hair removal (3,8). However, even with the significant increase in incidence of genital GAS within the past 50 years (9,10), there is limited data regarding hair removal practices in preparation for genital GAS and notable variation in hair removal techniques among practitioners. Consolidation of the limited literature can help guide the implementation of standardized care. To this end, we present a practical approach to hair removal prior to genital GAS. Modern hair removal techniques and a review of the literature provide context for our recommendations.

Hair removal techniques

Hair removal has advanced from physical methods of shaving, plucking, and waxing to the more technologically sophisticated techniques of electrolysis and laser hair removal (LHR) (11,12). While no technique achieves 100% permanent removal of all unwanted hair, electrolysis and LHR are the preferred treatments for permanent removal because of their higher efficacy. Surgeons performing genital GAS require preoperative permanent hair removal from any skin area that will either be brought into contact with urine (e.g., used to construct a neourethra) or be moved to reside within a partially closed cavity within the body (e.g., used to line the neovagina) (13-15). Hair within a neourethra will obstruct urine outflow, promote urine retention within the urethra, and often become encrusted with stone and sebaceous debris—all of which increase the risk of urinary infections and post-void dribbling of urine.

Hair within the neovagina serves as a nidus for infection and encrustation of debris. Hair bearing skin that remains outside of the body after GAS does not need to be removed (Table 1).

Prior to the advent of LHR, electrolysis was the predominant method used for removal of unwanted hair.
Electrolysis is the process of electric epilation, in use since 1875 and approved by the FDA for permanent hair removal (16,17). It involves the insertion of a fine needle or probe into each hair follicle for delivery of an electric current in attempt to destroy the follicular unit responsible for hair regeneration (17). Hair reductions up to 90% have been reported; however, the treatment efficacy is highly variable and operator- and modality-dependent, with regrowth ranging from 15–50% (16,18). Because each hair follicle must be treated individually, multiple hours of treatment on a weekly or biweekly basis for up to a year are generally required for best results (17,19).

LHR is an FDA-approved form of permanent hair reduction rather than permanent hair removal. The distinction between hair removal and reduction is mechanistic: LHR does not reduce the number of hair follicles, as electrolysis does, but rather reduces the number of hairs by damaging the follicular bulb while leaving the follicle intact. The mechanism of action of LHR is based on selective photothermolysis: laser light selectively targets melanin in the hair shaft, leading to destruction of the follicular epithelium (20). LHR can be performed with ruby, alexandrite, diode, and neodymium:yttrium aluminum garnet (Nd:YAG) lasers and intense pulsed light (IPL) sources, which operate at different wavelengths suitable for varying skin types and indications (21). Since the first FDA approval of LHR in 1995, LHR has become the fastest growing procedure in cosmetic dermatology, spread to several home-based devices, and demonstrated the longest hair-free period for removal of unwanted hair (12,21,22).

LHR has significant benefits over electrolysis, though studies with long-term follow-up are limited (23). Alexandrite-LHR provides higher clearance rates than electrolysis (74% vs. 35%, respectively) 6 months following treatment, is 60 times faster and less painful, and requires fewer treatment sessions (24). Electrolysis may be cheaper per session, but many hours may be required to treat each area of hair; in contrast, LHR will treat the entire area for hair removal during each session with faster procedure times, low occurrence of side effects, and fewer needed sessions (25). In addition, a Cochrane systematic review of 30 controlled trials concluded that efficacy of LHR is superior to that of electrolysis (23,26).

**Hair removal prior to genital GAS**

Although the literature on hair removal prior to genital GAS is limited, electrolysis has been commonly used for this indication, as it had been the sole solution for long-term hair removal before the advent of LHR (2,3,13,27,28).
Reliance on this practice has persisted in public and professional transgender health care forums, despite the absence of evidence-based clinical guidelines or peer reviewed data to support favoring electrolysis over LHR.

However, more recent studies specific to genital GAS support the use of LHR over electrolysis in this setting. A follow-up study of 232 patients who had undergone electrolysis before genital GAS found that those who underwent preoperative genital electrolysis did not report a reduction in postoperative vaginal hair complications compared to those who were not treated (3). On the other hand, a recent case report of long-pulsed alexandrite LHR on scrotal skin prior to genital GAS demonstrated no intra-vaginal hair growth at 15 months following vaginoplasty (27). Several case reports have also described the use of LHR for removal of urethral hair following hypospadias and stricture repair with minimal side effects and satisfactory outcomes up to 1 year following LHR (29-33).

**A proposed approach for preoperative genital LHR**

The shift towards LHR as a superior method of hair removal suggests that it should also be the treatment of choice prior to genital GAS. Based on the literature as well as from our own experience, we present the following recommendations specifically for hair removal prior to genital GAS.

**Preoperative evaluation: treatment planning and management of expectations**

The majority of transgender patients, unfortunately, report that they have experienced discrimination when seeking health services. During preoperative evaluation, practitioners of LHR should be attentive to using correct pronouns for each patient. We recommend that practitioners simply ask what pronouns a patient prefers. Some patients may not have had their name legally changed at the time of evaluation so asking patients their preferred name is also recommended.

LHR practitioners should confirm with patients that they have reviewed with their GAS surgeon which (if any) areas of their genitalia and flap donor sites should be rendered hair-free before surgery. Given the delay to surgery and costs that hair removal can create for patients, unnecessary hair removal should be avoided. Ideally, there can be direct communication between the GAS surgeon and treating dermatologist. In our experience, it is useful for the GAS surgeon to use a permanent ink-marking pen to outline the area to be made hair-free before the patient presents for hair removal. A photograph of this outlined area can also be useful during each treatment to ensure the correct area is being targeted.

Realistic patient expectations should be established, detailing potential adverse outcomes. The mean socioeconomic status of transgender patients is lower than that of non-transgender patients, and thus, affordability may be a substantial issue for many patients. The anticipated out-of-pocket costs to the patient and the likely number of treatments needed should be established before treatment (while LHR is not often covered by insurance, some companies cover LHR prior to genital GAS). Patients should be informed that each treatment will target existing hair bulbs, but that resting (telogen) follicles will grow hairs in between treatments until all the follicles have been treated. Patients should be aware that, in some cases, hair may regrow years later—though late onset hair regrowth is generally more sparse, thinner, and paler (21). LHR achieves best results for dark hair on light skin, as it targets the melanin in the hair bulb. Patients with darker skin should be treated with longer wavelength lasers to protect the epidermis (3+). For these same reasons, LHR is not suitable for blond or white hair, and patients with these features should be directed to undergo electrolysis instead. Although home laser units are now available, patients should be advised that the process is significantly more time consuming and may not yield the same results.

**Preparation before LHR**

Hair should be shaved prior to LHR to ensure that the melanin of the dermal hair bulb absorbs the laser energy without interference from melanin of hair above the epidermal surface. Shaving hair prior to LHR has been demonstrated to improve the efficacy of laser transmission and the mechanism of selective thermolysis (35). Any plucking, waxing, electrolysis, or other methods that remove the hair bulb should be avoided for at least 4 weeks before LHR because an intact bulb is the chromophore necessary to achieve selective photothermolysis (21,36). Patients should adhere to strict sun avoidance for a minimum of 6 weeks before and after each treatment because any tanning limits treatment efficacy and increases the risk of side effects, such as dyspigmentation (21). Further, patients taking minoxidil (or with partners using the topical agent) should be advised that the stimulating effects of the drug
may disrupt hair removal (37).

**Anesthesia**

Topical anesthetic pretreatment includes 30-minute to 1-hour incubation with creams, such as lidocaine, prilocaine, or tetracaine (21). Tetracaine has been documented in use for LHR of scrotal skin (27). The use of a cooling fan or device may provide comfort during the procedure, and ice can be applied immediately afterwards. Topical steroids can be used following treatment to reduce redness and swelling.

**Area of hair removal**

Areas of hair removal for genital GAS can include the forearm, anterior thigh, and scrotum. The surgeon should always confirm with the patient and, whenever possible, the treating dermatologist exactly which area should be rendered hair-free before surgery.

**Male-to-female (MtF) genital GAS**

Creation of a vulva (vaginoplasty) can include or not include creation of a vaginal cavity. Vaginoplasty without creation of a neovaginal cavity generally does not require any hair removal preoperatively, as any hair-bearing skin will be visible and easily accessible after surgery. Vaginoplasty with creation of a neovaginal cavity requires that the penile shaft skin be made hair-free because with the most common vaginoplasty technique (penile inversion vaginoplasty), the penile shaft skin is used to line the vaginal cavity and will be out of reach for hair removal procedures after surgery (38). Some transgender women undergoing vaginoplasty with vaginal cavity formation may require harvest of scrotal skin for use to line the vaginal cavity. If the surgeon plans to use a pedicled scrotal skin flap, the anterior midline face of the scrotum should be treated to ensure that the skin used has been rendered hair-free; (B) when a pedicle-flap of scrotal skin (hatched outline) will be used, only the flap area needs to be rendered hair-free. Typically, the flap is made from a midline segment of scrotal skin that is 10-cm wide (stretched), and extends cephalad, from a 1-cm wide base of skin at the junction of the perineum and scrotal skin.

**Female-to-male (FtM) genital GAS**

Only transgender men undergoing phalloplasty with urethral lengthening (construction of a neourethra) require preoperative permanent hair removal. The skin-flap area that will be used to construct the neourethra must be rendered free of hair-growth to avoid hair-related complications. Residual hair on the skin that will be used to make the phallus shaft need not be
Figure 2 Radial artery forearm flap hair removal. For patients who will undergo FtM radial artery forearm flap phalloplasty, the majority of skin from the forearm (non-dominant) is used for reconstruction. While flap dimensions may vary with patient anatomy and by surgeon preference, we typically create both a neourethra (U) and neophallus (P) using a single skin-flap with the dimensions shown (in cm). The urethral skin segment is typically located medially, where people naturally have less hair. Only patients who will undergo phalloplasty with urethral lengthening require preoperative permanent hair removal in the area of the urethral segment (U). Patients undergoing phalloplasty without urethral lengthening can undergo permanent hair removal of the neophallus (P) skin any time after surgery, as all phallus skin is exposed.

treated, as it is easily accessible for treatment post-op. Skin for phalloplasty with urethral lengthening is commonly harvested from the forearm radial artery (forearm flap) phalloplasty (RAP) (39) or the anterolateral thigh [(ALT) flap phalloplasty] (40–42). With RAP, the skin used for construction of the neourethra is ~5 cm wide and harvested from the medial aspect of the ventral face of the forearm (Figure 2). For RAP, we recommend hair removal of the medial aspect of the entire ventral forearm.

With ALT flap phalloplasty, the skin area used to construct the neourethra can be harvested from the medial or lateral aspect of the same flap template as is used with RAP. The flap is located on the anterolateral surface of the thigh, centered slightly distal or proximal to the halfway point between the anterior superior iliac crest (proximally) and the lateral aspect of the patella (distally) (Figure 3). The exact location of the skin area to be used in ALT flap phalloplasty is less predictable, as the surgical margins vary with the vasculature to the flap area. Generally speaking, the entire flap area lies within the middle 2/3 of the ALT. We recommend that patients undergoing ALT flap phalloplasty ask their surgeon to specify exactly what area should be rendered hair-free before the patient commences hair removal treatments.

**Laser settings**

The laser to be used should be a long-pulsed laser with a wavelength appropriate to target melanin, such as a diode, alexandrite, or long-pulsed Nd:YAG. Selection of laser wavelength should take the patient’s skin color into account, and the fluence, pulse duration, and cooling should be optimized to achieve immediate destruction of the bulb with perifollicular erythema, while protecting the epidermis from thermal injury. Selection of laser settings requires training in the use of these devices. The American Society for Dermatologic Surgery recommends that LHR
be practiced only in an appropriate setting by, or under the direct supervision of, a physician.

**Number of treatments**

An evidence-based review reported that multiple LHR treatments result in increased efficacy of hair removal (22,26,43). The European Society for Laser Dermatology recommends three to eight LHR treatments (36), and the American Academy of Dermatology states that most patients need between two to six treatments. Treatments, which may each take up to 30 minutes, should be spaced at least 6 weeks apart to allow for hair cycling. Our experience with genital GAS is that it is best to wait 3 months after the last planned hair removal treatment before proceeding with surgery, in order to confirm that no further hair regrowth will occur.

**Conclusions**

Despite long experience with electrolysis for hair removal prior to GAS, evidence-based outcomes studies have shown LHR to be the superior modality. LHR has largely supplanted electrolysis for permanent hair removal in the medical setting. We present a practical approach to LHR for genital GAS, which will inform future studies needed to develop evidence-based guidelines for best practice in the field.

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**Footnote**

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