

## **Clinics Review Articles**

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# **Hair Restoration**

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### **EDITORS**

Raymond J. Konior  
Steven P. Gabel

### **CONSULTING EDITOR**

J. Regan Thomas

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REVIEWS

# Use of Body Hair and Beard Hair in Hair Restoration

Sanusi Umar, MD<sup>a,b,\*</sup>

## KEYWORDS

- Body hair transplants • Beard hair • Scalp transplantation • Eyebrow transplantation • FUE • Follicles

## KEY POINTS

- Body hair (beard, leg, chest, and other areas below the neck) can be used by itself or in combination with scalp hair to provide coverage in cases of severe baldness, to aesthetically improve hairlines and eyebrows, restore facial or other body hair, and camouflage scarring.
- Body hair retains some of its characteristics but the recipient site can also modify them minimally; thus, matching likely final hair characteristics is important.
- Leg and chest hair does not typically grow to the same length as scalp hair and short hairstyles may be needed.
- The skill level and time needed for successfully transplanting body hair is higher compared with conventional follicular unit extraction.
- Potential patients, regardless of gender, must be hirsute or have sufficient hair for the surgery to be successful.

## INTRODUCTION

Conventional follicular unit hair transplantation often leaves linear scars at the donor site. In some instances, the scar is not acceptable and may require camouflage or subsequent revision using trichophytic closure or controlled tension at closing.<sup>1,2</sup> In contrast, when individual hair follicles are transplanted using the technique of follicular unit extraction (FUE) the result is minimal scarring.<sup>3</sup> Moreover, FUE offers other options in cases where the head hair donor supply is limited.

Typically, the average safe donor area (SDA) of the occipital scalp contains about 12,500 potential, transplantable hairs<sup>4</sup> but because two to three hairs are usually associated with each follicular unit, this means only about 6000 follicular units can be transplanted.<sup>5</sup> In individuals who have

moderate to severe baldness (Norwood baldness scale of 6–7) at least two to four times as many follicles are required for reasonable coverage. As a result, the choices of using exclusively head donor hair can be inadequate. In these situations, it is possible to use nonhead hair sources, including the beard, chest, and legs in hirsute individuals, which increases the potential follicle supply. Moreover, because leg hair is much finer,<sup>6</sup> it can also be used to create a softer, more natural-looking hairline, particularly if miniaturization of hair follicles has occurred as a result of androgenetic alopecia.<sup>6,7</sup> Besides fixing unnatural hairlines and filling in donor scarring from previous hair transplantation procedures, restoring eyebrows, eyelashes, and moustaches is also possible using nonhead hair transplantation.<sup>2,5,6,8,9</sup>

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Disclosures: S.U. is the founder of DermHair Clinic.

<sup>a</sup> Dermatology Division, Department of Medicine, University of California at Los Angeles, Los Angeles, CA, USA; <sup>b</sup> DermHair Clinic, 819 North Harbor Drive, Suite 400, Redondo Beach, CA, USA

\* DermHair Clinic, 819 North Harbor Drive, Suite 400, Redondo Beach, CA.

E-mail address: [drumar@dermhairclinic.com](mailto:drumar@dermhairclinic.com)

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Transplanting nonhead hair using FUE is more demanding of the patient and is technically challenging for the surgeon. In addition, one has to deal with the consequences of donor dominance, defined by Orentreich<sup>10</sup> as the “retention of donor hair characteristics at recipient sites,” in which beard hair is coarser, whereas chest and leg hair are shorter, finer, and tend to be curlier than scalp hair. Although several studies suggest that transplanted hair is influenced by the recipient site (eg, growing slightly longer and becoming straighter over time),<sup>11–13</sup> my experience performing hundreds of body hair-to-head transplantations is that the recipient influence seems to be cosmetically insignificant.<sup>5,6</sup>

This article focuses on the use of body hair and beard in hair restoration, which has not been widely described in the literature. The reader can expect to know the indications and effective techniques for performing hair transplants using nonhead hair donor sources. Pitfalls and risks are also discussed.

## TREATMENT GOALS

### ***Definition of Process, and Distinction from FUE Using Head Hair Donor Sources***

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FUE traditionally involves restoring balding areas of the head by extracting grafts *in vivo* from the SDA one follicular unit at a time. It is a minimally invasive process involving little pain and is performed with patients receiving local anesthesia and a mild sedative. Depending on the number of grafts to be transplanted, most procedures can be scheduled over the course of several back-to-back work days with additional work for extensive cases scheduled months later. Microsurgical techniques allow patients to usually return to most normal activities the day after surgery is completed with healing ranging from 3 weeks to 4 months.

The use of nonhead donor hair in FUE requires several considerations related to follicles. Hair follicles renew themselves through a cycle consisting of three distinct phases: (1) anagen, (2) catagen, and (3) telogen. Research into a fourth phase, commonly called the exogen phase, is ongoing.<sup>14</sup> Although 85% to 90% of scalp hair is anagen hair, between 40% and 85% of body hair can be in the telogen phase, and the anagen phase of body hair is much shorter, a few months compared with several years for head hair.<sup>15–17</sup> Consequently, it is not only desirable to change these proportions before harvesting grafts but also develop a method where late-phase anagen hair can be identified, because early phase anagen and telogen hair are unsuitable for transplantation (being

much more fragile and susceptible to transection during the extraction processes). The characteristics of the recipient hair have to be matched to the donor hair, taking into account hair diameter, color, curliness, typical rate of growth, and shaft angle. However, the slight modifications of these parameters by the recipient area may occur but are generally of minimal cosmetic significance.<sup>5,6</sup>

### ***Indications for Use of Nonhead Hair Donor Sources in General***

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In hirsute individuals, the use of nonhead donor hair is considered in situations of a relative or absolute lack of head donor hair supply. Head donor supply may be rendered inadequate because of a severe bald state. An example of this scenario is a Norwood 6 to 7 patient requiring global coverage with only a total head donor hair supply of 6000 to 7000 follicular units. Another situation is a patient who has undergone prior hair transplants that have resulted in a depletion of head donor supply but who still has a significant amount of bald areas that require restoration.<sup>5</sup> Nonhead donor hair can also be used to provide coverage for baldness in conjunction with scalp hair from the occipital region where the level of baldness is not too severe.

### ***Special Indications for the Use of Specific Nonhead Donor Sources***

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Some hair restoration scenarios can take advantage of the innate characteristics of certain types of nonhead hair to especially produce more natural and realistic results. The following are examples.

1. Because hairs from the extremities, such as legs, are innately finer and shorter compared with hair from the SDA, they are a natural fit for eyebrow restoration. This is also the case for vanguard hair in hairlines and temple areas where leg hair nascent characteristics make for a softer, more natural look. Such an approach could also be especially beneficial for the repair of previously transplanted harsh hairlines.<sup>6</sup> Other individuals who may benefit in this situation include Asians who have thicker hair at the back of the scalp and persons with dark hair and contrasting lighter skin.
2. Patients requiring restoration of upper facial hair, such as mustaches or side burns, could find a more natural fit in using beard hairs from the neck areas of the beard.
3. Beard hair, which is coarser, is a viable alternative for camouflaging a donor scar from a previous procedure.<sup>2</sup>

## PREOPERATIVE PLANNING

Planning should include identification of the donor hair sources, approximately how many grafts are needed from each source, and mapping where the donor source hair will be transplanted. It is generally preferable to use a hybrid of hairs from different donor sources in the recipient to create a blended look, which is aesthetically more pleasing than a mosaic look that could result from grafting islands of nonmixed body hairs. By estimating the number of grafts needed and where the grafts will come from, and by assuming that 1500 to 1800 grafts can be transplanted in 8 to 9 hours, surgeons can calculate how many days of surgery are required to achieve the overall treatment goal for the patient.

In my earlier work, I sometimes conducted test transplants to verify outcomes several months later to ensure that the yield and final hair characteristics were reasonable and within patient goals. This is no longer necessary in most cases.

### Patient Selection

In general, patients regardless of gender must be hirsute. The quantity, quality (thicker caliber hair preferred), and hair distribution at the donor area are all important considerations in deciding on preferred candidates. Vellus hair has less chance of growth, and is cosmetically inconsequential if it does grow. As in any indication for hair transplantation, all other nonsurgical options must have been explored and found to be nonviable in relation to the patient's goals (although they can still be used in conjunction with hair transplantation).

For potential patients who are African American, it is generally observed that those with tight curls have a higher transection rate that may not produce acceptable outcomes. Anecdotally, I have observed that, apart from the tightness of the curls, another significant factor causing a higher transection rate in this demographic population is the skin texture and graft relationship with surrounding tissue: tougher skin texture and a tighter connection of the follicle to the dermal tissue results in a higher transection rate. Consequently, any at-risk patient seeking head and nonhead FUE should be first tested by extracting 25 to 50 grafts and observing for transections before a large-scale surgery is planned.

### Managing Expectations

It is important for patients to understand that the quality of transplanted nonhead hair is not as high as that of scalp hair and that survival rates

are not as high for transplanted body hair compared with transplanted head hair. Although the recipient site does seem to influence the characteristics of the donor hair minimally, with the exception of beard hair, transplanted body hair may not grow as long or fast as head hair. Consequently, patients are advised, at least initially, to keep their hair cut short. Body hair could also initially be a different color than head hair, although over time sunlight and other factors can bleach exposed transplanted hair in the scalp. As a result, the body donor hair usually assumes the lighter look of the surrounding recipient site hair. Nevertheless, transplanted gray hair almost always stays gray.

In the case of eyebrow transplants, despite best matching efforts, donor hair taken from different areas of the body can often present characteristics, appearance, and growth rates that are dissimilar compared with existing eyebrow hairs. Thus, patients should be advised accordingly to expect a need for more frequent trimming of the transplanted eyebrow. However, leg and arm hair, which are innately finer and shorter, require less frequent trimming on transfer to the eyebrows compared with eyebrows that have been transplanted using hair from the SDA.

## PREPARATION

### Donor Preparation

Anagen hair selection is performed by two maneuvers. In the case of body hair extractions, donor areas are pretreated with 5% minoxidil once or twice daily for a variable period of 6 weeks to 6 months before surgery. This is done because minoxidil shortens the telogen phase by inducing follicles resting in the telogen phase to begin the anagen phase,<sup>18</sup> although no study has reported how effective this is in human body hair. In human scalp hair it has also been reported that minoxidil increases the duration of the anagen phase and hair diameter.<sup>19</sup>

Donor areas are also shaved 7 to 10 days before the first surgical procedure so that late-phase anagen hair is readily identified. This procedure has its roots in the phototrichogram used by Saitoh and coworkers<sup>20</sup> for anagen hair quantification whereby the skin was shaved and growing hairs were counted 2 or more days later.

### General Preoperative Instructions

Apart from the lengthy pretreatment with minoxidil, patients are instructed on how to pre shave the donor areas 7 to 10 days before the surgery date. Because scalp and beard hair are often in

anagen, these anagen hair selection maneuvers are not necessary. Caution is taken to avoid overuse of minoxidil when large areas are involved. Patients are also advised to watch out for hypodynamic and irritant symptoms of minoxidil side effects and to stop further application of minoxidil should any symptom occur.

## PROCEDURAL APPROACH

Surgery proceeds more smoothly when the patient, surgeon, and assistants are coordinated in the process. Because sessions can take up to 8 or 9 hours, patient and surgeon ergonomic comfort is of paramount importance. The correct operating table is vital; a table that does most of the postural changes rather than the patient or surgeon is most ideal. An operating table should ideally be capable of tilting sideways in addition to the usual Trendelenberg and reverse Trendelenberg positions. A versatile height adjustment capability, and independent head and back maneuverability, is also very helpful. If leg hair transplantation is to be performed, a table with leg-splitting capabilities is useful, as are maneuverable armboards for arm hair harvests.

I have determined that certain orthopedic tables are better suited for the procedure (**Fig. 1**). For example, a body hair transplant surgery would involve focusing on the head in one moment and yet on the legs in another. Thus, a cool lighting unit hung from the ceiling or wall but with very wide range of movement is helpful.

If any scalp hair is to be transplanted to the recipient area, FUE is done first in this area. For specific donor areas, the following patient positions are recommended. Beard hair extraction is best done with the patient face up and the neck extended to expose the neck and jaws adequately. Chest and abdominal area hair are

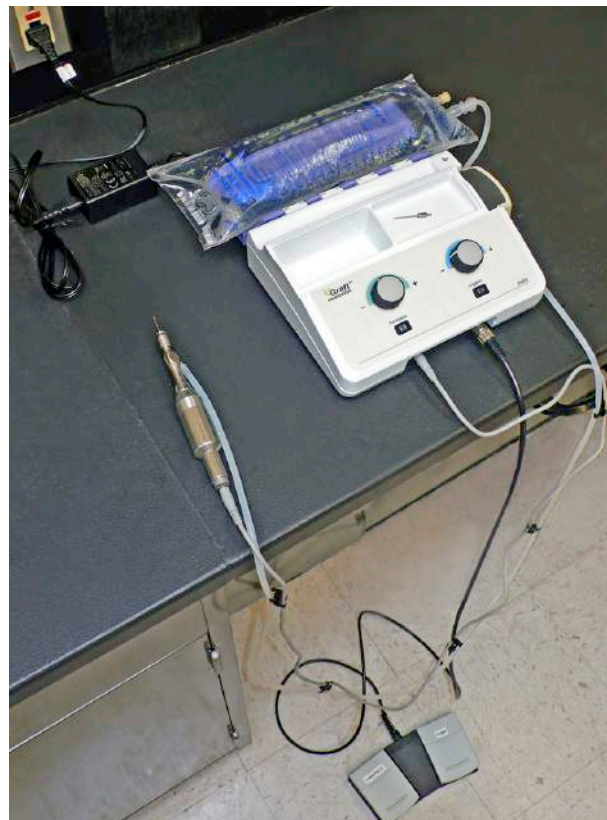
best harvested with the patient in a recumbent position and the surgeon to the side adjusted for hair direction and surgeon's preferences. Arm and forearm hairs are best harvested with the arms extended out on an arm board. Leg hair extraction is done with a right-handed surgeon sited to the right side of the right leg (legs lying side by side) for right leg hair. For left leg hair extraction the best position for a right-handed surgeon is to be sited in between the two legs facing the left leg (see **Fig. 1**).

The recipient areas of the head are shaved and marked and the donor areas identified. Hair transplantation is performed under local anesthesia by subcutaneous injections of epinephrine (1:100,000) and lidocaine 1%, and bupivacaine hydrochloride 0.25%, in a 5:1 ratio for recipient areas, and a further dilution (5:1) with normal saline for donor areas. Tumescence is not performed in the donor areas.

A rotary tool is used to mount a hypodermic needle (18- to 20-gauge) whose tip has been modified to form a proprietary punchlike instrument (**Figs. 2** and **3**). Although other punch brands could be adapted for the procedure, the author uses the aforementioned proprietary punches that pull the graft up as it cuts around the graft. This reduces the exactness with which



**Fig. 1.** Orthopedic table demonstrating leg splitting capability and positioning for left leg hair extraction by a right-handed operator.



**Fig. 2.** Equipment set up showing irrigation system in place.



**Fig. 3.** Close up of console and handpiece used by author.

the operator must trace the angle of the follicle deep to the skin. The axis of the cutting edges of the punch is directed away from the follicles thus minimizing graft damage. The rotation of the punch should be clockwise for optimal effect. Additionally, the handpiece used by the author integrates a controllable fluid irrigation system that hydrates each graft at the time of scoring (see **Fig. 2**). In the absence of such an irrigation armed handpiece, the grafts can be hydrated with a piece of gauze using a 2- to 3-minute interval between the time of scoring and actual removal of the follicles. Individual hair follicles are excised using sharp rotating needle tips to a depth exceeding the bulge area. Freed hair follicles are easily pulled out with occasional aid of blunt needle tip dissection and placed in sterile petri dishes containing chilled Ringer lactate solution or other physiologic solution.

As observed in numerous cases, wounds created by these customized punches widen with depth, so injury to follicles is diminished and wound closure accelerated. The wounds created thus tend to have inverted or straight edges favoring faster healing than in substantially everted wound edges. All grafts are extracted first and then transplanted in order of extraction.

For recipient grafting, slits are created by means of blades custom-sized to the dimensions of the extracted grafts.

## **PRACTICE PEARLS**

### ***Deciding for Each Day's Session Which Hairs Should be Transplanted***

Because of limitations of how many hairs can be transplanted for a given patient during a session for each day (typically a 1500- to 1800-hair maximum), it is worth developing a strategy to determine which hairs should be transplanted

(donor and recipient areas) each days when multiple sessions are contemplated for a patient in a given week. This strategy can be modified according to day-to-day experience and is not necessary for a one-time session.

### ***Anesthetic Technique***

This is primarily for the patient's comfort and the avoidance of toxicity. The author uses diluted forms to minimize toxicity because compared with head donors body hair extraction surface areas are typically larger. In the neck areas especially, the injecting needle must be kept superficial and in constant motion to avoid delivering bolus doses into major veins or arteries. Factors to consider are length of anesthesia, how anesthesia should be staged during the session, and ensuring that the anatomic areas to be operated on are properly covered.

### ***Minimizing Transection and Maintaining Follicle Integrity***

The rotary punch tool developed by the author minimizes transection while allowing a good rate of follicle extraction, but its use does require experience on the part of the practitioner. The punch or other cutting device should permit good alignment with the shaft angle while cutting out an adequate amount of surrounding tissue and minimizing soft tissue trauma.

### ***Create Appropriate Transplantation Angles (Follicles)***

When creating recipient slits the angle must be appropriate to the part of the head being transplanted and the overall hair structure (eg, creating a whorl on the crown of the head).

### ***Density of Follicle Transplants***

Target density varies from one recipient location to another and can vary from 15 to 60 follicular units per square centimeter depending on location, patient presentation, goals, and what is reasonable given overall donor supply potential. In patients with risk factors for scalp necrosis (eg, smokers or repair patients with prior flap procedure or patients with prior history of necrosis), densities should be kept low per session. Incisions should also be kept small. In some instances, higher density needs are met by scheduling further sessions several months later. Intervals between surgery of greater than 10 months is preferred in these instances.

## POTENTIAL COMPLICATIONS AND THEIR MANAGEMENT

When beard hair is the donor source, local anesthesia commonly causes transient, mild paresis of oral mimetic muscles that last 1 to 2 hours. In addition, hypopigmentation at the extraction site of beard hair may occur, especially in darker skin. However, this is usually tolerable for appearance.<sup>2</sup> Uncommon wound complications, such as hypertrophic and keloidal scarring, can occur in susceptible individuals, and good preoperative clerkship is necessary.

## IMMEDIATE POSTPROCEDURAL CARE

Nonhead hair donor sites are left open and coated with bacitracin or Neosporin ointment for the first 7 days after surgery twice a day, and triamcinolone lotion 0.1% is used daily for the first 3 days after surgery. Oral antibiotics, although not necessary, may be given for 5 to 7 days postsurgery. Cephalexin, or a substitute in the event of drug allergies, is used to cover gram-positive bacteria. In the absence of minoxidil allergies, the author has recommended that recipient areas are treated with propylene glycol-free oil-based



**Fig. 4.** (A) Patient 1: front and top head view of a patient before surgery. (B) Patient 1: rear and top head view of a patient before surgery. (C) Patient 1: front and top head view after body hair transplantation. (D) Patient 1: rear and top head view after body hair transplantation.

minoxidil starting 3 to 7 days postsurgery. The use of minoxidil is advised for 12 months after surgery.

Complete healing, when there are no visible signs of surgery or scarring, typically occurs between 6 weeks and 4 months. Scabs at the recipient site typically resolve in 7 to 14 days. Within 3 to 6 months, the donor extraction site is typically healed without cosmetically significant scarring. In nonhead hair-involved transplants, the author has observed that 10 months is the optimal time to attain results, although improvement could continue into the 18th month.

Beard extractions (especially if carried out below the jaw line) typically heal with a cosmetically excellent profile. This time may vary from 3 to 6 months. The process can, however, be hastened by early laser treatments starting at the second week postoperatively. Laser treatments can be carried out with intervals of 4 weeks. A fractionated erbium or CO<sub>2</sub> laser is suitable if the extraction site is noted to be depressed below skin-level, whereas if redness is dominant, a 595-nm pulse dye laser with a V-beam is used.

**Fig. 4A** and **B** show the front and rear of the head of a man with Norwood 7 status. Twelve thousand grafts were transplanted from the head and beard; 1 year later the complete head exhibits full coverage with pleasing aesthetic results (see **Fig. 4C, D**). **Fig. 5A** shows a previously transplanted patient with sparse hair coverage over the entire Norwood 6 area that was restored using 9000 grafts derived from the head, beard,

and chest, which 1 year later demonstrates full coverage (see **Fig. 5B**). **Fig. 6A** shows a patient with sparse eyebrows, whereas at 4 months his eyebrows show significant restoration after grafting with 450 leg-derived hair grafts (see **Fig. 6B**). **Fig. 6C** depicts the patient's right leg a few days after leg hair extractions, which were used for his eyebrow restoration.

## REHABILITATION AND RECOVERY

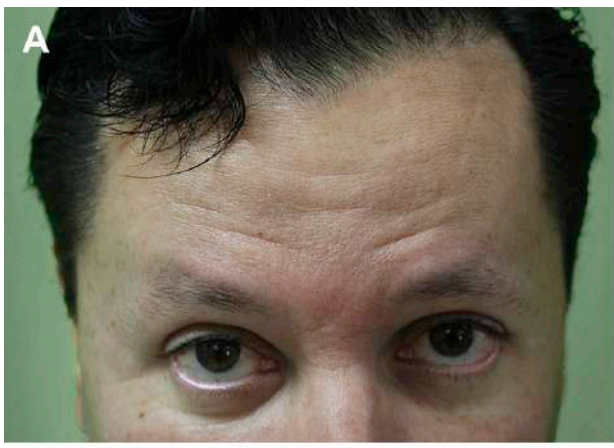
It can take several months or even a year for the full effect of body hair transplants to be seen. During this time, the patient should be instructed on general hair care, especially with hair treatments. When the patient has had severe baldness or problems that require extensive repair (or both), and before surgery the client used wigs or other methods to disguise these issues, it is often difficult for the patient to make the psychological adjustment from using to not using a wig. There is a strong temptation to resume the use of wigs immediately after surgery. I prefer the discontinuation of wigs altogether, although in extreme circumstances the wig could be used for 12 hours of the day and removed overnight. In these instances, clip-on wigs must be used and glues avoided. As discussed in the management of patient expectations, patients should be counseled that in some instances, the hair looks best if kept short, because body hair does not grow as long as head hair.

If beard hair was used predominantly, styling gels may be used to overcome the wiry and unruly



**Fig. 5.** (A) Patient 2: top front view of a patient before surgery. (B) Patient 2: Top front view after body hair transplantation.





**Fig. 6.** (A) Patient 3: eyebrows of a patient before surgery. (B) Patient 3: right leg at 7 days after leg hair extraction for eyebrow grafting. (C) Patient 3: eyebrows at 4 months after body hair transplantation using leg hair.

tendencies of beard hair. Hair dyes can also be used to even out hair colors if deemed cosmetically necessary or as dictated by taste.

## SUMMARY

When used appropriately, body hair by itself or in combination with hair from the SDA can improve the overall aesthetic appearance of a bald scalp, and especially hairlines and eyebrows. Body hair can also be used to camouflage existing defects from prior hair transplantation surgeries or in situations of relative or absolute lack of head hair donor supply. General limitations in the use of body hair and beard hair in hair restoration include the longer procedure required (often over several sessions); the higher level of skill required on part of the surgeon; more specialized instrumentation and equipment; the variations in hair angulation; the likelihood that the quality of nonhead hair may not be as high compared with donor head hair; the need for sufficient body hair; and the much higher cost than many scalp hair transplants (because of the need for the FUE procedure).

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