

# Hair Transplantation

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*Hair transplantation is a purely dermatologic surgical procedure that dermatologists should be able to perform in appropriate candidates with hair loss. Hair transplantation techniques performed in the 1960s through the 1990s utilized large grafts that created an unfortunate public image of unnatural-appearing transplanted hair. Over the last 15 years, hair transplantation has been performed using follicular units to create consistently natural-looking transplanted hair in both men and women. This article provides an overview of candidate selection and state-of-the-art techniques for performing hair transplantation.*

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**I**n the 21st century, men and women who undergo hair transplants expect consistent natural-looking results (Figures 1 and 2). Hair transplantation is a purely dermatologic surgical procedure that is performed under local anesthesia. As experts on hair loss, dermatologists should not only be able to diagnose the etiology of a patient's hair loss but treat it both medically and surgically. This article reviews candidate selection, the role of drug therapy in combination with surgery, guidelines for administration of anesthesia, donor harvesting techniques and graft creation, staff training, and future trends in hair transplantation.

## Candidate Selection

Men and women with any skin type or hair color can be candidates for hair transplantation. Key physical characteristics that may impact results include the density and caliber of hair follicles at the donor site. Donor hair density is measured by the number of

follicular units per square centimeter. Patients with high donor hair density have more hair follicles available for transplantation than those with lower donor hair density. If there is a limited number of donor follicles available for harvest, the cosmetic impact from the procedure will be limited; therefore, patients with low donor hair density generally are not considered good candidates for the procedure. Furthermore, the

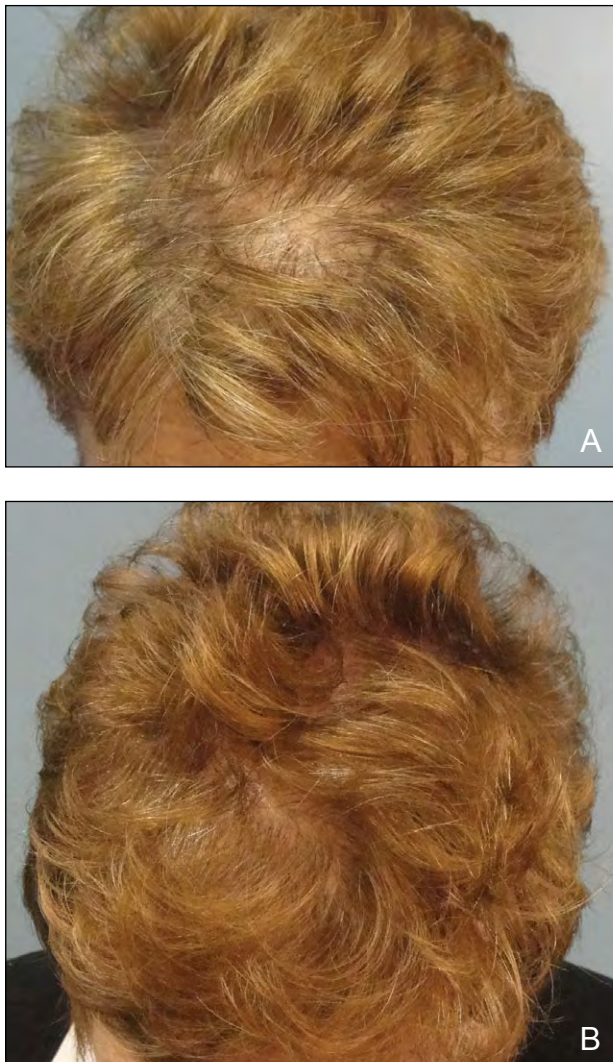


**Figure 1.** A male patient before (A) and after undergoing hair transplantation (750 grafts of 1 to 3 hair follicles)(B).

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**Figure 2.** A female patient before (A) and after undergoing hair transplantation (650 grafts of 1 to 3 hair follicles)(B).

caliber of a patient's hair follicles will influence the perceived density of the transplanted hair. For instance, an equal number of transplanted follicular groupings in a patient with coarse wavy hair will appear more dense than in a patient with fine straight hair.

Patients undergoing hair transplantation must understand that the cosmetic appearance and density of transplanted hair will be affected by the ongoing nature of male or female pattern hair loss. Because transplanted hair grows long-term, it is important for physicians to plan the procedure with the premise that the patient will continue to lose hair. For optimal results, transplanted hair should be distributed in a pattern that will look natural 1 year or 15 years after the procedure. The frontal scalp typically produces

the most satisfactory long-term results in both men and women. With continued hair loss, transplanted hair at the vertex of the scalp may develop an unnatural appearance; therefore, hair transplantation in this area should only be performed on select patients.

Patients should understand how limited donor hair density, the caliber of hair follicles, and ongoing hair loss can affect the short-term and long-term results of hair transplantation.

### Drug Therapy

Currently, there are 2 drugs approved by the US Food and Drug Administration for male pattern hair loss and 1 approved for female pattern hair loss. Minoxidil and finasteride are both approved for male pattern hair loss; minoxidil is the only drug approved for female pattern hair loss.<sup>1-3</sup>

Compliance is the key to success when using hair loss drugs. Many patients presenting for hair transplant consultations report that prior treatment with minoxidil and/or finasteride was not effective. In my own practice, patients have reported that they used a drug for a few weeks or months but did not see any benefit and therefore stopped taking it. Before beginning drug therapy for hair loss, it is important for the patient to understand the drug's potential risks, benefits, and side effects, and that its efficacy cannot be clinically evaluated for 6 to 12 months after starting treatment. Regardless of the drug's effectiveness, hair transplantation procedures should be planned assuming that patients will stop drug therapy in the future. If a patient does continue short-term or long-term drug therapy, ongoing hair loss will be minimal, resulting in greater perceived hair density.

Recently, there have been reports of the potential for long-term sexual side effects and depression associated with finasteride.<sup>4,6</sup> These reports have raised concern among patients and physicians, but there currently are no long-term double-blind studies either confirming or refuting these reports. Hopefully, more well-designed studies will be conducted in the next 1 to 2 years and we will have better data to confirm or refute these reports.

### Anesthesia Administration

In the majority of patients, hair transplantation is performed under local anesthesia. Lidocaine is the most commonly used anesthetic. The key to success is superficial infiltration of the dermis, which allows both better pain control and hemostasis for the patient. Epinephrine that is mixed with lidocaine constricts superficial vessels in the dermis, resulting in minimal bleeding in the skin while recipient sites are created with fine needles and grafts are placed with microvascular forceps. Conscious sedation is

performed in patients who experience anxiety or who simply prefer being sedated. Conscious sedation should only be performed in an accredited facility.

### Donor Harvesting Techniques

The amount of hair in the donor region is the only limiting factor in hair transplant surgery; therefore, efficiency in harvesting follicular groupings is critical. There are 2 methods for harvesting donor hair: elliptical donor harvesting (Figure 3) and follicular unit extraction (FUE)(Figure 4). Both are performed with patients in the prone position to provide optimal access to the occipital donor region.

Elliptical donor harvesting was introduced in the mid-1990s.<sup>7</sup> On the posterior scalp, a donor ellipse contains hundreds to thousands of follicular groupings that can be utilized for hair transplantation. A quick and efficient technique, harvesting a donor ellipse is similar to standard excision in dermatologic surgery. Once the donor ellipse is removed, the wound is closed with either staples or sutures. The



**Figure 3.** The elliptical donor harvesting technique is used to remove a donor ellipse from the posterior scalp.



**Figure 4.** Follicular unit extraction is used (1-mm follicular units) on the posterior scalp.

size of the donor ellipse depends on the amount of grafts that are needed for the particular patient. On average, there are 65 to 85 follicular groupings per square centimeter.<sup>8</sup>

As with any cutaneous excision, elliptical donor harvesting will create a scar on the scalp. For patients with hair long enough to camouflage the scar, there typically is no cosmetic concern; however, for patients with shorter hair, FUE is an excellent alternative method.<sup>9</sup>

Follicular unit extraction utilizes the same steel punch technique that was used to extract donor hair from the 1960s until the early mid-1990s. The difference with FUE is the size of the instrument used to harvest the donor hair. In the past, 3- to 5-mm steel punches were used to harvest grafts that contained multiple follicular groupings; with FUE, 0.75- to 1.25-mm steel punches are used to harvest individual follicular units. These punches are so small that they do not leave visible scars. Therefore, the FUE method is an option for patients who wear their hair closely cropped; however, the trade-off is that physicians are unable to acquire as many follicular groupings from an individual FUE session as they can from an elliptical donor session. A patient may need 2 to 4 FUE treatments to receive an equal number of follicles that can be obtained via elliptical donor harvesting. Another challenge is the higher rate of transection of hair follicles using small punch biopsies, which can be minimized through the experience and skill of the hair transplant surgeon.

More recently, robotic FUE has been introduced into the field. The robot is able to skillfully remove large numbers of follicular units with minimal transection. This technology is a major advance in the harvesting of individual follicular units without leaving a visible scar. Current challenges associated with robotic FUE include the machine's purchase and operation costs as well as the physical space it requires. Over the coming years, further refinements will allow it to play an ever larger role in donor harvesting.

### Graft Creation

If an ellipse donor is used, it is divided into individual follicular units as soon as the donor region is closed. Most hair transplant teams use some form of magnification for this step. Typically, 2 to 4 surgical assistants meticulously separate the follicular groupings using steel blades. An experienced hair transplant team can separate 1000 to 1800 follicular groupings in approximately 1 to 3 hours. The key is to separate the follicular groupings with minimal damage to the hair follicles. As the follicles are separated, they are placed in chilled saline. Grafts should never be allowed to

dry or they will lose their regenerative potential. For patients undergoing FUE or robotic surgery, the harvested follicular groupings are carefully examined and trimmed to make sure there is no transection and that they will easily fit into the recipient sites.

### Staff Training

A well-trained surgical team is essential to the success of any hair transplantation procedure. Although there is no particular background or credentials for surgical assistants, a genuine interest in hair transplantation is a key attribute. In busy dermatology practices, staff members often are cross-trained as hair transplant assistants in addition to serving other roles in the practice. In my experience, it takes 6 to 12 months to train an assistant to separate follicular groupings from a donor strip and place them at recipient sites. Staff members can gain experience by observing colleagues as well as attending regional hair transplant workshops and dermatologic surgery meetings.

### Future Trends

All patients, both men and women, expect consistent natural-looking transplanted hair. The challenge is to create the maximum possible hair density that will still look natural 1 year or 15 years after the procedure. Currently, the quantity of available donor hair follicles is the only limiting factor in hair transplantation. The cloning of hair follicles would allow an unlimited donor resource, which would revolutionize the current limitations of the procedure, but the ability to clone hair follicles is still an advancement that is years away. The future will also bring about further advances and refinement in robotic hair transplant surgery. Robots will both harvest and place follicular units with greater efficiency than the most experienced hair transplant teams, which will eliminate the need for large skilled hair transplant teams. Currently,

hair transplantation provides consistently natural results for men and women.

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