

Hair Transplantation in Women

Treating Female Pattern Baldness and Repairing Distortion and Scarring From Prior Cosmetic Surgery

Jeffrey S. Epstein, MD

The role of hair transplantation in men is well established. In women, the procedure is much less common, but has a definite role in the management of female pattern baldness and the repair of alopecic scarring and hairline distortion as a result of prior facial plastic surgery. When performing hair transplantation in women, there are differences in technique from that used in men to consistently achieve excellent results and minimize complications. Over the past 3 years, I have performed 86 hair transplant procedures on women. Most of these cases were for female pattern baldness. The techniques used and typical results are presented herein. When performed properly for the appropriate indications, hair transplantation is an effective procedure with a very high level of patient satisfaction. *Arch Facial Plast Surg. 2003;5:121-126*

While over 95% of all hair transplant procedures are performed on men, women are candidates also and undergo hair transplant procedures for the treatment of several conditions. Hair loss in women in most cases is, like in men, genetic in origin, and progressive. The current train of thought regarding female pattern baldness (FPB) is that it occurs along several different patterns, the most common consisting of diffuse thinning along the top and upper sides and back of the head, often sparing the frontal hairline.¹ This, the classic FPB pattern, is divided into 3 stages according to the Ludwig classification scheme, with stage 1 consisting of mild hair loss and stage 3, extensive hair loss.² In patients with stage 1 and most cases of stage 2 classic FPB, as well as those with some of the less common patterns, there usually is sufficient hair density in the donor region (mid-occipital region) to make transplantation at least somewhat effective at restoring density to the thinner areas. Women with stage 3 FPB are usually advised not to undergo the procedure, but rather to consider the purchase of a hairpiece or hair system.

The other condition in women effectively treated with hair transplantation is the alopecic scarring and hairline distortion associated with prior plastic surgery. The most common type of distortion is the loss of the sideburns caused by those rhytidectomy incisions that extend superiorly, rather than horizontally, from the upper aspect of the ear, thus pulling the temporal tuft along this superior vector.^{3,4} While this incision design is superior for dealing with the lateral brow region, the hairline distortion it often produces can cause significant hair styling difficulties. Another type of distortion is the excessive elevation of the frontal hairline associated with coronal brow-lift incisions in patients with preexisting high foreheads.⁵ Alopecic scarring most commonly occurs along the frontal and temporal incisions of brow-lifts and the occipital incisions of rhytidectomy. Finally, representing a combination of hairline distortion and scarring is the loss of hair in the superior temporal region anterior to certain rhytidectomy and most brow-lift incisions due to tension vectors in a superior-posterior direction and inadvertent transection of the superficial temporal artery. The goal of hair transplantation in these cases is to restore hair growth in the scarred and thinned-out

From the Department of Otolaryngology, Division of Facial Plastic & Reconstructive Surgery, University of Miami, Miami, Fla. Dr Epstein is also in private practice in Miami.

areas and to recreate the normal anatomy of the temporal tufts and the frontal and temporal hairline.

There are a variety of hair transplantation techniques, which basically differ according to graft size and the technique of graft preparation. Over the past 3 years, the technique of follicular unit grafting (FUG) has largely become accepted as the technique of choice for most hair restorations. This technique requires the microscopic dissection of the donor material into grafts, each containing a single follicular unit. The follicular unit consists of 1 to 4, most commonly 2 or 3, hairs in a single bundle, with the sebaceous gland elements and other supporting tissue, surrounded by an adventitial sheath.⁶ This is the way the hair on the scalp grows naturally, and theoretically, by keeping the follicular unit intact, the pattern of hair growth has the potential to be virtually completely natural. Microscopic dissection is required for FUG to assure the integrity of the unit and to allow the maximum amount of non-hair-bearing scalp skin to be dissected from the graft.⁷

Because of its technical difficulty in requiring a team of trained assistants to dissect as many as several thousand grafts in a single procedure, most hair transplantation surgeons do not perform FUG, but rather the conventional technique of micro/minigrafting (MM), also called mini/micrografting. Using accepted terminology, the micrograft contains 1 or 2 hairs, and the minigraft contains 3 to 6 hairs.⁸ Dissection of these micrografts and minigrafts is performed under direct or magnified visualization. The MM technique does not respect the integrity of the follicular unit; instead, the grafts are dissected out according to the numbers of hairs per graft that are required for the restoration. For example, the surgeon will request that a donor strip be divided into a certain number of 1- and 2-hair micrografts and certain numbers of small minigrafts of 3 and 4 hairs and, perhaps, larger minigrafts of 5 and 6 hairs. With this technique, no effort is made to remove the excess non-hair-bearing tissue, therefore grafts are larger than their follicular unit graft counterparts that contain the same number of hairs.

While it is beyond the scope of this article to discuss the advantages of FUG vs MM, several distinctions can be made. The MM technique is simpler, enabling the procedure to proceed quicker with fewer assistants. In addition, some surgeons believe that MM affords them the ability to achieve a greater hair density. While technically more difficult to create, the smaller grafts of FUG allow for closer placing of grafts for increased hair density, minimal to no scarring of the recipient scalp, less trauma to already existing hairs in the area transplanted, and up to a 20% greater yield of hairs from a given-sized donor strip.

SURGICAL TECHNIQUE

TREATMENT OF FPB

When performing hair transplantation on women with FPB, the limited supply of donor hairs limits the amount of coverage that can be achieved. While most patients would like to have all the thinning areas treated, the hairs

should be transplanted into those areas where they will provide the maximum benefit. Most commonly, these areas are the anterior/mid-top of the scalp posterior to and sometimes up to the frontal hairline and along the area where the hair is parted. It is critical to assess the donor region to make sure that enough hair is present to make the procedure worthwhile.

For the best results, the procedure should maximize the number of hairs transplanted while minimizing the trauma to the existing hairs. This is usually best accomplished by transplanting grafts containing 3 to 5 hairs, except along the hairline where smaller grafts of 1 or 2 hairs that contain a single follicular unit are placed to assure a natural appearance. Patients need to be assured that the larger grafts of 3 to 5 hairs do not result in a "transplanted" appearance because they are used to fill in areas between existing hairs. While these grafts are bigger than classic follicular unit grafts, they are still prepared using single-strip harvesting and microscopic dissection to minimize inadvertent damage (and therefore loss) of the donor hairs.

In the typical case, 600 to 800 grafts (or about 2500 hairs) are transplanted. The recipient sites are slits made by a 3.5-mm or smaller blade carefully placed between existing hairs to minimize accidental transection of or damage to the follicles. SpearPoint blades (Ellis Instruments, Madison, NJ) in sizes from 1.5 mm to 4.5 mm and the smaller SharpPoint blades (Ellis Instruments) in sizes of 15°, 22.5°, 30°, and 45° are appropriate for making the recipient sites for the larger and smaller grafts, respectively.

The grafts are placed atraumatically into the incisions. **Careful handling, along with keeping them moist,** minimizes damage and ensures good growth. To minimize ischemic shock to the existing hairs, the local anesthetic contains a low concentration of epinephrine, generally less than 1:200000. To further minimize the loss of hairs due to shock and to accelerate the regrowth of the transplanted hairs, 1 week after the procedure, the patient should restart the daily application of 2% minoxidil (usually they will have already used the minoxidil in the weeks leading up to the procedure to help stimulate additional hair growth, stopping its use 3 days prior to reduce the risk of significant bleeding). With this regimen, the hairs can be expected to start growing at 2.5 months, rather than the typical 4 months.

TREATMENT OF HAIRLINE DISTORTION AND ALOPECIC SCARRING FROM PRIOR FACIAL COSMETIC SURGERY

The management of scarring from prior facial cosmetic surgery usually includes the restoration of the sideburn and other areas of distortions and the repair of alopecic scarring. Aesthetic restoration of the sideburn begins with the recognition of its natural appearance in terms of location, direction of hair growth, and feathered look. Of particular importance are the superior to inferior and anterior to posterior direction of hair growth and the fineness of the hairs, especially along the anterior and inferior borders. Areas of scarring, typically located in areas surrounded by hair, should be transplanted with larger

grafts so that even if there is less than the expected 90% of hair growth in the scar tissue, there still is the potential for sufficient coverage.

The technique of choice in these cases is FUG. This procedure provides the 3- and 4-hair grafts for filling in areas of scarring, the 2- and 3-hair grafts for augmenting density along the upper temporal and posterior sideburn regions, and the finest 1-hair and occasionally 2-hair grafts for sideburn restoration and feathering along the leading edge of the restoration. In certain cases in which the finest single-hair grafts are desired, purposeful transection of the follicle leaving the hair shaft, including its bulge region, intact can result in finer hair growth.

In the FUG technique, the donor hairs are removed as a single strip and the site closed primarily with a running 3-0 polypropylene (Prolene; Ethicon Inc, Somerville, NJ) suture. A 10-cm² donor strip (1 cm in width by 10 cm in length) will typically provide 600 to 800 follicular unit grafts, which is more than adequate to meet the minimal need for the 150 to 200 grafts for each sideburn and the additional 75 to 100 grafts for each upper temporal region. Because donor density varies significantly among patients, the size of the donor strip is adjusted according to the density as well as the number of grafts that are needed. If necessary, additional donor material can be harvested during the procedure.

A team of assistants using the binocular microscope dissects the grafts. While the grafts are being cut, the surgeon makes the recipient sites. A number of instruments are available for this step. It is my choice to make these recipient sites as tiny slits with SharpPoint blades. After being made, the recipient sites are filled with their correspondingly sized grafts.

No bandages are applied, and the patient may begin hair washing on the second day. Growth of the transplanted hairs typically begins by 3 months, after which, if desired, an additional procedure can be performed to increase density.

RESULTS

Over the past 3 years, 86 hair transplant procedures have been performed on 61 women. Of the 86 procedures, 59 were performed exclusively for the treatment of FPB, 21 were performed exclusively for the repair of hairline distortion and/or alopecic scarring from prior facial cosmetic surgery, and 6 were performed for both indications. Patient ages ranged from 25 to 78 years, with a mean of 52 years.

For the treatment of FPB, the number of grafts ranged from 75 to 1250, with the overwhelming proportion of patients (51 of 59) receiving 600 to 800 grafts. Hair growth was consistent in all cases, and patient satisfaction was extremely high. A case example is presented in **Figure 1**.

For the repair of scarring and hairline distortion from prior cosmetic surgery, the number of grafts ranged from 250 to 1500, with most patients (16 of 21) receiving 650 to 750 grafts. The most common indication for surgery was the restitution of a normal side-

burn, with less common indications including, in descending order of frequency, alopecic scarring along a temporal vertical incision, hair thinning along the upper temporal region anterior to a brow-lift or extended rhytidectomy incision, alopecic scarring along an occipital rhytidectomy incision, and frontal hairline recession and/or alopecic scarring from a brow-lift incision. Hair growth was rapid, in some cases beginning as soon as 10 weeks after the operation, and patient satisfaction extremely high. Case examples are presented in **Figures 2, 3, and 4**.

COMMENT

The role of hair transplantation in women is becoming more recognized as an option in the treatment of a variety of hair loss conditions. Women are increasingly learning that they can benefit, as do men, from the newer techniques in surgical hair restoration. While there are certain inherent limitations in the results of hair transplantation for the treatment of FPB, it is my experience that, when they are appropriate candidates, these patients are among the happiest. For many of these women, the results of a relatively small number of hairs transplanted strategically into areas of maximum benefit can restore confidence and avoid the need for the wearing of a hair-piece or hair system.

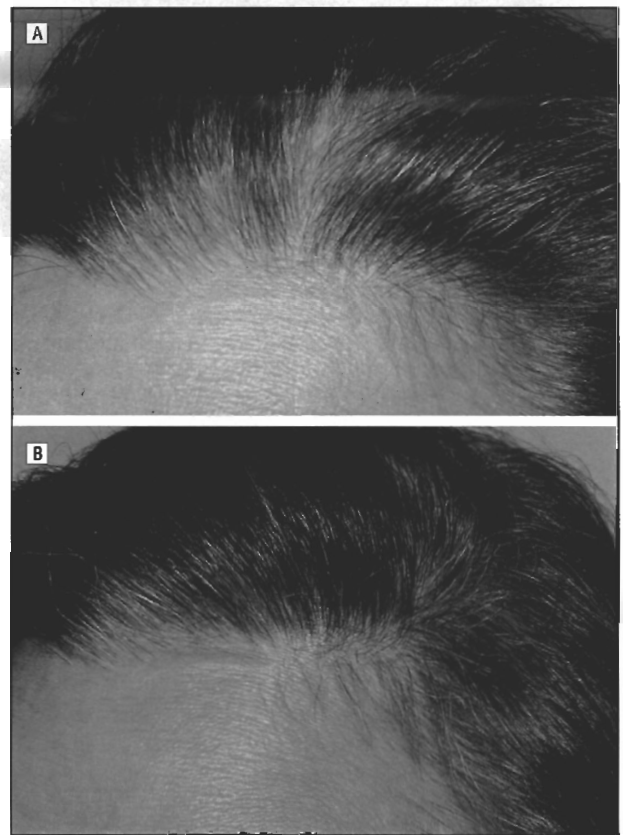


Figure 1. A 34-year-old woman with an advanced hair loss pattern concentrated in the anterior and mid-scalp region. She was treated with a single procedure of 575 grafts, 180 containing 1 to 3 hairs placed along the hairline and 395 containing 4 to 8 hairs placed further posterior. A, Before the procedure; B, 6 months after.



Figure 2. A 57-year-old woman 9 years after rhytidectomy with loss of the temporal tufts and thinning with recession of the upper temporal region and lateral frontal hairline. A total of 1050 grafts were transplanted: 375 follicular unit grafts of 1 and 2 hairs to restore the sideburns and 675 grafts consisting of 2- to 4-hair follicular units to restore density to the upper temporal and lateral frontal regions. A, Before the procedure; B and C, 10 months after.

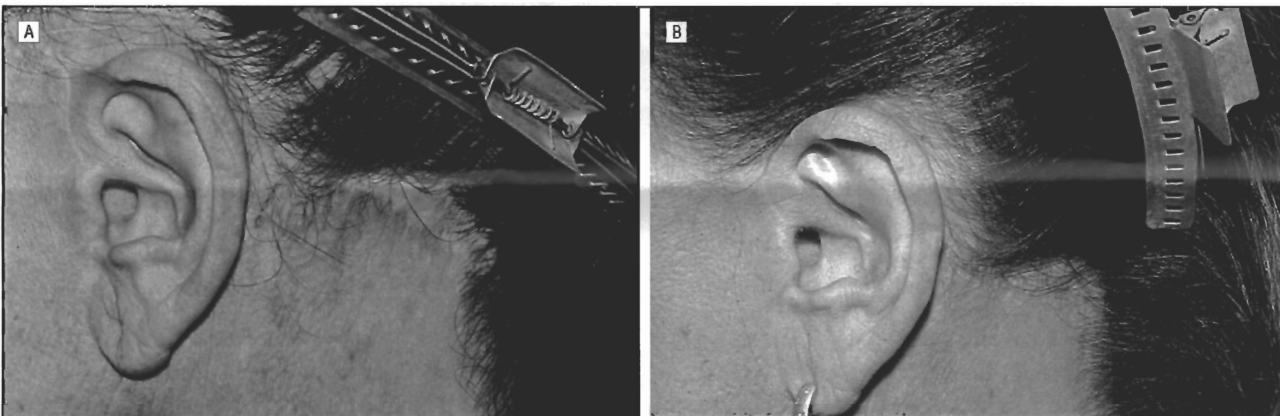


Figure 3. A 59-year-old woman 5 years after rhytidectomy with loss of temporal tufts and significant scarring of the upper temporal and occipital regions. A total of 1000 follicular unit grafts containing 1 to 3 hairs were transplanted: 350 to restore the sideburns and 650 to repair the area with temporal and occipital scars. A, Before the procedure; B, 6 months after.

Several types of FPB have been described in the literature. From a therapeutic perspective, it is necessary to divide these many patterns into 2 general patterns: diffuse thinning and thinning concentrated along the top of the head similar to male pattern hair loss. Because the second pattern tends to have a better donor hair density, it is more suitable for treatment with hair transplantation. Divided into 3 stages, those with stage 1 and most cases of stage 2 have sufficient donor density to provide sufficient hair to make transplantation worthwhile. In addition, those with the diffuse thinning pattern can usually benefit from hair transplantation, although not as impressively.

Hair transplantation for pattern hair loss in women is not merely the same procedure as performed in men. As discussed in the "Surgical Technique" section, certain precautions must be taken to minimize iatrogenic hair loss in the recipient region, which seems to occur

much more frequently in women. Precautions include using local anesthetics that do not contain epinephrine, minimizing the number of recipient site incisions, and using larger grafts to achieve a maximal increase in hairs per graft placed. Patients with moderate to advanced patterns are advised on the probable need for a second and perhaps additional procedures. Even in cases in which satisfactory density was achieved after 1 procedure, the progressive nature of pattern hair loss usually makes the performance of an additional procedure necessary in the future.

The treatment of hairline distortion from prior cosmetic surgery uses smaller follicular unit grafts than the larger grafts used for treating FPB. The most challenging area to restore is the lost sideburn. In no other part of the scalp are the hairs as fine or the direction of growth so distinct and critical for natural appearing results. However, when properly performed, patient satisfaction with



Figure 4. A 69-year-old woman 2 years after rhytidectomy and coronal brow-lift, with significant recession of the entire hairline, loss of temporal tufts, and thinning of the upper temporal region. A total of 1400 follicular unit grafts containing 1 to 3 hairs were transplanted: 300 to restore the sideburns, 800 to advance the frontal and upper temporal hairlines, and 300 to restore density to the upper temporal and lateral frontal regions. A, Before the procedure; B, 10 months after.

what was otherwise a successful face-lift procedure can be restored.

Other techniques have been described for sideburn restoration, including transposition flaps^{3,9} and MM.¹⁰ While it does restore the sideburn, the flap procedure results in an unnatural dense appearance, can create further alopecic scarring of the adjacent donor site, and does nothing to restore any thinning or posterior hairline displacement of the temporal region. Micro/minigrafting procedures are an improvement over flap repair, but tend to result in a less than natural “grafted” appearance with detectable grafts and hypopigmented scarring of the skin around the grafts.

The FUG procedure is the natural evolution of the MM procedure. All grafts are dissected out using the microscope or other form of magnification and contain a single follicular unit. The follicular unit is the natural bundling of hairs as they grow in the scalp. This technique is my procedure of choice for nearly every hair restoration procedure performed because the results are the most natural in appearance and recipient scarring is minimal to nonexistent.

For the most part, hairline distortion is a preventable event with rhytidectomy. With secondary and tertiary procedures, or when significant upper and mid-

upper facial rejuvenation is sought, hairline distortion becomes more difficult to prevent. The “traditional” rhytidectomy incision extends from the supra-auricular crease through the temporal region in a mostly vertical direction, displacing the entire temporal hairline, including the sideburn, superiorly and posteriorly. Alternate incisions, such as one that extends mostly horizontally from the supra-auricular crease through the upper aspect of the sideburn (peritemporal trichophytic) can minimize hairline distortion. Beveling incisions so that follicles are preserved along the leading edge of the incision minimizes scarring.

When transplanting into scar tissue, hair growth can often be compromised. This is probably because the decreased blood supply is not able to support the growth of transplanted hair follicles. It is my experience, as well as that of others in the literature, that transplanted hairs will indeed grow in the scar.¹¹ The percentage of “take” of the transplanted hairs is reduced, sometimes by as much as 50% (compared with the greater than 90% growth rate of hairs transplanted into normal nonscarred tissue). To compensate for the reduced percentage of hairs that will grow, I transplant 4-hair grafts where it is hoped that 2 or 3 hairs will actually grow. It is also important that recipient sites be made slightly larger and/or deeper to pro-

mote bleeding and potentially enhance the neovascularization of the graft hairs.

While this article has focused on the surgical treatments for hair loss, it is important to remember the role of the medical workup for FPB. While very unusual, hair loss in women can be due to a number of medical causes, including elevated levels of testosterone, hypothyroidism, nutritional factors, and postpregnancy hormonal changes. In the female presenting with pattern hair loss, in addition to taking a thorough history and examination, several laboratory tests are conducted, including tests for thyroid function, total testosterone, and dehydroepiandrosterone sulfate.

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Corresponding author and reprints: Jeffrey S. Epstein, MD, 6280 Sunset Dr, Suite 504, Miami, FL 33143.

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