

Combining Follicular Unit Extraction and Scalp Micropigmentation for the Cosmetic Treatment of Alopecias

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Abstract: Two relatively new modalities, follicular unit extraction (FUE) and scalp micropigmentation have changed the treatment of hair loss, to reduce the number of procedures and the total costs of the hair restoration process. These 2 modalities augment each other when treating patients with thinning hair and balding. The explosion of FUE procedures (which reflected 52.6% of the hair transplant procedures performed in 2016, up from 48.5%) and the appearance of more and more new physicians offering hair restoration technologies employing FUE have caused a 20% annual growth in this industry over the past few years. This article reviews the use of FUE and scalp micropigmentation when used in combination. (*Plast Reconstr Surg Glob Open* 2017; 5:e1420; doi: 10.1097/GOX.0000000000001420; Published online 7 November 2017.)

The hair industry reflects a huge industry in products and services.¹ The presence of thinning and genetic balding is present in 50% of men under 50, and 50% of postmenopausal women. This has been a cosmetic problem that impacts almost every family at some point in time.

The cosmetic treatment of hair loss falls into 3 major categories: (1) gels, mousse, and other similar products that thicken the hair by adding moisture to the hair shaft causing the hair shaft to swell, hair attachments and hair systems that add hair bulk to the thinning/balding area with animal or synthetic or human hair make up the largest component of this category; (2) the use of concealers that are powered type materials that are applied to the hair and scalp and are used to reduce the contrast between hair and skin color in the balding or thinning areas; and (3) various surgical and nonsurgical treatments, usually offered by physicians, such as follicular unit extraction (FUE) transplantation (1 of 2 techniques used in hair transplantation today) and scalp micropigmentation (SMP), which together reflect an almost \$3 billion industry.²⁻⁵ With the advent of FUE, a perceived minimally invasive hair transplant surgery, this procedure has produced a greater awareness and demand for hair transplant services by more and more men.

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What is particularly notable is that hair restoration services are now being offered by many physicians entering the field from primary care and other specialties. These services mainly include FUE rather than the traditional strip surgery. With newer technologies now available, the skill sets required are not as great for either the surgeon or the staff. This has caused a reduction in referrals for existing hair transplant surgeons as more and more physicians are incorporating these services into their nonhair restoration practices to take advantage of the financial opportunities rather than referring patients to existing providers.

LIMITATIONS TO HAIR TRANSPLANTATION

Hair transplantation has an intrinsic limitation in the hair supply for advanced balding patients. The demand for hair is proportional to the size of the balding area and in patients with large balding patterns; the supply (~20–25% or the original hair count) that reflects wreath of hair around the side and back of the head cannot match the need for hair. This wreath of hair usually lasts the lifetime of the patient. In my practice over the past 26 years, my group has performed hair transplants on thousands of patients with advanced hair loss patterns (Norwood Class 6 and 7 patterns), and many of them have had procedures between 7,000 and 10,000 grafts. All of these patients were Caucasians who had higher than average donor hair densities that provide for large numbers of grafts, harvested over multiple procedures. With people of Asian or African descent, donor hair densities are lower, measured at ~20% less for Asians and 30–40% less for Africans. To

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reduce the number of hair transplant surgeries and make it easier for patients to achieve their goals in less time and at less cost, the authors have pioneered SMP and have combined it with hair transplantation in an attempt to solve the hair supply/demand limitations of the hair transplant process.³⁻⁵ The use of SMP can create a ‘fuller looking’ head of hair; even when the actual hair densities are low. Merging these two modalities has been performed in our practice over the past half-decade.

As a result of the huge growth of the FUE market originating from our seminal 2002 article on FUE and multiple publications addressing SMP, the growth of both of these modalities in the physician marketplace is increasing. Physicians who have recently entered the hair restoration space, are now becoming the ‘go to’ providers for these technologies. If they exploit these two modalities, they can increase the scope of their ‘non-insurance’ service offerings and improve their revenues. Money drives new doctors into this industry. The author’s practice has radically changed, as well, as FUE and SMP have been merged. SMP now accounts for 30% of our revenues. Combining these two technologies reflect a reduction in the number

hair restoration procedures that the patient might have to get to achieve a desired result. With the propagation of FUE and SMP services, physicians can now address the balding/thinning problems of nearly 100% of patients of all races with hair loss, regardless of the degree of hair loss that is present.

SMP involves placing a stippled pattern of tattoo dots on the scalp, changing the color and appearance of the scalp. The stippled pattern can create a normal appearing head of hair when no hair exists (Fig. 1). When a stippled pattern is placed below a thinning head of hair (e.g. a hair transplant patient that does not achieve a normal hair density or on a person with alopecia), this stippled pattern produces a background such that the appearance of a full head of hair is easily obtained (Fig. 2). This creates a very effective illusion and for most people, satisfactorily meeting their overall goals for a full looking head of hair.

In most traditional hair restoration practices, a single surgery would be followed by a second and possibly a third surgery to obtain the desired fullness. When SMP is used instead of a second hair transplant surgery, the goals can more easily be achieved.

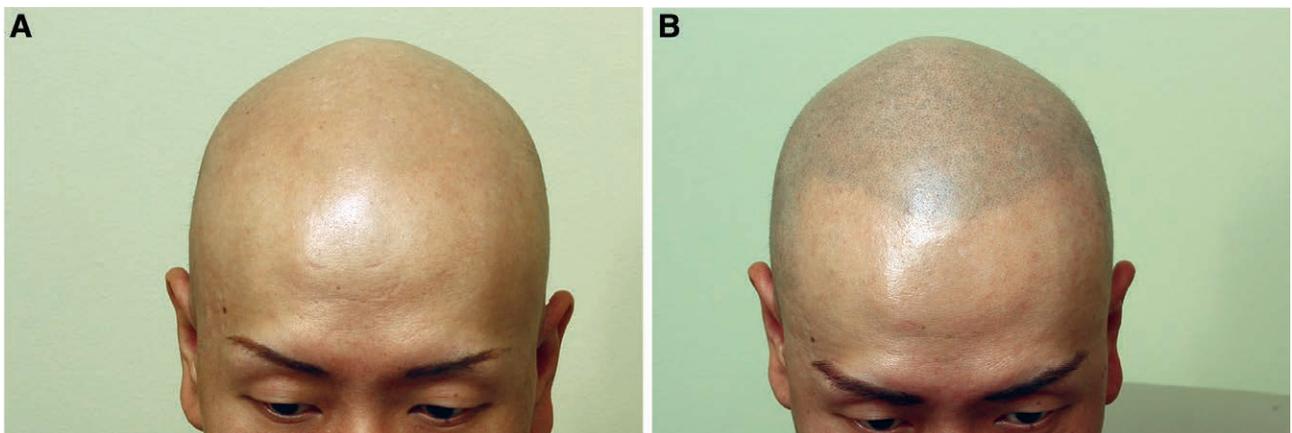


Fig. 1. Patient with alopecia totalis having SMP to create a normal appearing hair distribution and hairline.



Fig. 2. This image shows a patient who had a single hair transplant with good results. The lack of fullness reflected the patient’s fine hair not the number of grafts.

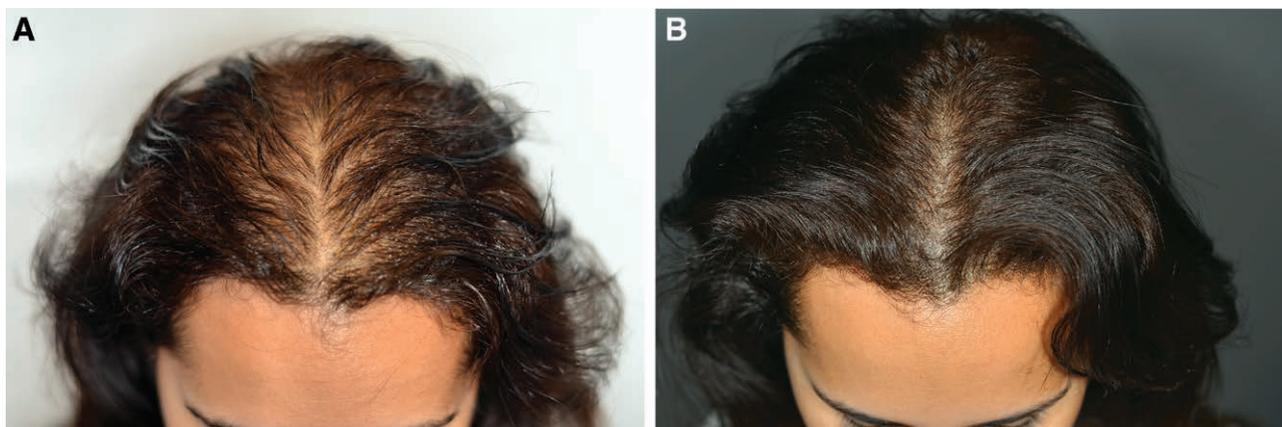


Fig. 3. A forty-year-old woman with thinning hair with a diagnosis of diffuse alopecia, probably genetic in origin. This condition is in her family history where her mother and sister were similarly impacted.

SMP, A TREATMENT FOR THINNING HAIR

Hair transplantation is less effective for treating thinning hair particularly as the thinning area gets more extensive. Fully 80% of women with post-menopausal/genetic thinning have hair loss that is too diffuse for hair transplantation. Many of these women have significant miniaturization of the hair in the donor area as well, making their donor area less ideal as a source for transplanted hair. Most women today resort to the use of powders, pastes, hair attachments, products that allow the hair to thicken as it takes on water and spray-on concealers to address their thinning hair. Their goals are to decrease the contrast between their hair and skin color, thereby making their hair look fuller. In our recent publication on SMP³ we have been using SMP as the sole modality in treating many women with thinning hair. Specially trained SMP technicians produce the highly labor intensive stippled patterns on the scalp to mimic closely cut hair follicles. This imparts a reduction in the contrast between the hair and scalp color. When done in the doctor's office, local anesthesia allows for a pain-free experience. SMP is an ideal treatment for thinning hair in men and women.

Many forms of diseased alopecias including alopecia areata, alopecia totalis, scarring alopecias, most scalp scars from previous hair transplant or neurosurgical surgical procedures, and hair loss from chemotherapy and other wasting diseases, can also be effectively treated with SMP.³ SMP is a technique that can be deployed by doctors interested in expanding their practices to encompass this cosmetic treatment for almost all forms of alopecia and offered as a permanent cosmetic tattoo. The authors believe that the market demand will become far more significant as more providers develop the skills for providing these SMP service. For women with diffusely thinning hair (approximately 50% of women who pass-through menopause), there is no effective medical or surgical therapy (including hair transplantation). SMP can address this huge untapped market opportunity for physicians as these techniques can be easily learned and delegated to trained on-site personal.

MODERN HAIR TRANSPLANTATION

Modern hair transplantation focuses upon moving the anatomical unit of hair, the follicular unit, from places in the scalp where it is relatively permanent (a 3-in. high area of hair in the back and side of the head) and is not impacted by genetic hair loss⁶ to the areas impacted by genetic balding. The donor area hair must be healthy for this process to work, which is the case for most men with genetic hair loss but not for most women who have a diffuse hair loss that extends into this donor area. Otter Norwood reported that men with genetic alopecia lose their hair in patterns and these patterns are responsible for 98+% of genetic hair loss in men. In women, on the other hand, the Ludwig Patterns of female hair loss represent only about 20% of genetic hair loss in females (my approximation from the thousands of women I have examined and treated over the past 26 years). In most men, the "donor area" is spared by the genetic hair thinning/balding process. Unfortunately for women, 80% of genetic hair loss demonstrates miniaturization of the hairs in back and sides of the head making it less than satisfactory for a hair transplant procedure. We see diffuse unpatterned alopecia in many of these women. When the donor area is miniaturized, this area is a poor source for hair if used in the transplantation process. DUPA has been seen in some men and when it appears in men, this condition is generally a contraindication for any surgical hair transplant procedure.⁷⁻¹⁴

The hair transplant process is a supply/demand challenge, where the wreath of hair around the side and back of the head, reflects between 20% and 25% of the total head hair count. This area must supply the donor needs of the balding areas (front, top, and crown) while leaving enough hair in the donor area to maintain a full looking appearance. The key is to harvest enough hair to address the balding problem but not too much hair to deplete the donor area (approximately 40–70% of this donor area hair can be harvested in a person's lifetime). For many men and women, the supply falls short of the demand. In men with more advanced balding patterns, the supply of donor hair is particularly challenging in Asians who have 20% less hair than Caucasians and Africans who have between 30%

and 40% less hair than Caucasians. Fortunately, a return to the original density in the recipient area is not needed for reasonable hair transplant outcome. Depending upon hair characteristics (hair, skin color, and hair character including thickness), 20–40% of the original density in the balding area often meets the needs of most people. Kinky or very curly hair, hair for hair, covers the scalp better than straight hair of comparable thickness. People with coarse hair cover better than people with fine hair and when the supply is low (as in Asians with fine, black hair and a light skin color). By combining hair transplantation with SMP in these people, a full looking head of hair can be obtained in almost everyone, even those who have more advanced balding pattern and fall short of an adequate donor supply.

MATCHING DONOR SUPPLY WITH PATIENT'S NEEDS

The donor area (the wreath or hair around the side and back of the head) is generally not impacted by male genetic balding. This reflects a surface area (conservatively) of 20% of the total scalp bearing skin. In an average Caucasian with approximately 100,000 hairs on the head (50,000 follicular units of 2 hairs each), the harvestable area reflects between 40% and 70% of this donor area or 10,000 of the original follicular units. This wide range of potentially harvestable hair can be quantified in mathematical relationships that reflect hair shaft thickness. Fine hair has the lowest “bulk” value and coarse hair having the greatest “bulk” value. Between 4,000 and 7,000 harvestable follicular units (grafts) can be obtained in the “average” Caucasian. When the donor density is higher, the harvestable follicular units can be higher. As a doctor cannot move the entire donor area hair, enough hair must be left behind to maintain a look that is not see-through. Experience teaches the doctor just what this balance is and limits the amount of donor area harvesting that the doctor can perform to achieve 2 goals: (1) moving enough hair to address the patient's balding/thinning problem and (2) leave enough hair behind to maintain coverage in the donor area. When SMP

is added in such patients, less transplanted hair is needed to achieve the patient's desired fullness.

TODAY'S FUE

This type of hair transplantation consists of removing 1 follicular graft (1–4 hairs each), 1 at a time with some type of punch directly from the donor area in the back of the head. There are many punch designs and even a robot to perform this tedious task of coring and removing grafts. The public thinks of FUE as a scarless surgery; however, there are punctate scars measuring approximately 1 mm each for each follicular graft removed limiting the closeness of the “shaved style” that many of today's male patients often want.

The surgeon does not require the surgical skills required of a more traditional strip hair transplant surgery and the process is faster and less labor intensive, often requiring only the surgeon with 1 or 2 assistants to perform the surgery. With the use of implanters for placing grafts into recipient sites, the skills required are substantially less than with the traditional forceps used for the past few decades and just a couple of technicians can easily place these grafts in a few hours.

DONOR AREA DEPLETION

When large amount of donor hair is removed from the donor area over time, the impact is different between (1) the strip harvesting technique and (2) the FUE technique. Good planning with strip surgery, keeps the donor wounds always in the lower-center portion of the donor area, just above the occipital notch and affords more grafts in the long term. Most surgeons remove the previous scar with each successive procedure, when possible. When the surgeon follows this rule (i.e., when graft excision totals over ~5,000 grafts for a typical Caucasian), the upper part of the donor area stretches to accommodate the excised scalp at the expense of the donor density throughout the remaining donor area. When the surgeon does not follow this rule and the surgeon overharvests the donor area in traditional strip surgery, particularly when too many different incisions are made, the donor area becomes a problem with a see-through look (Fig. 4).



Fig. 4. Depleted donor area with a see-through problem for the patient was created from excessive strip procedures with too many harvesting incision locations. These pictures display before (A) and after (B) treatment with SMP in the donor area.

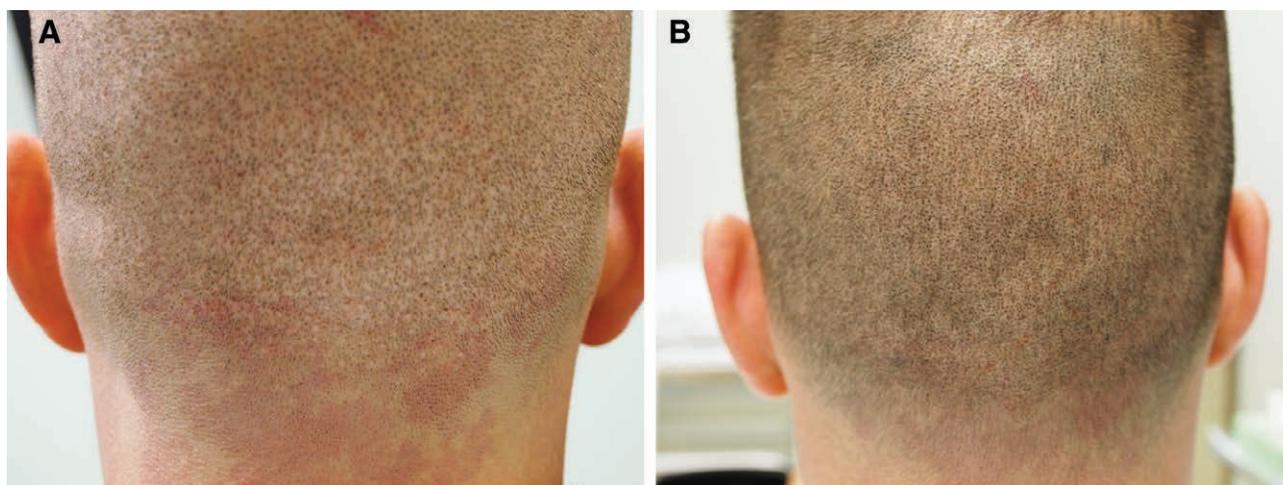


Fig. 5. Patient who wanted to have a very short haircut but had a moth-eaten appearance after FUE. This patient was treated with SMP.

With FUE, stretching of the donor area does not occur; however, punctate scarring appears. Unfortunately, there are many patients now appearing with depleted donor areas from overharvesting in FUE procedures, which reduce the donor density to such a degree that the same phenomenon appears as with donor-site depletion from strip excision surgeries as shown in Figure 5. Regardless of the etiology of a depleted donor area, the only effective treatment that can solve the patient's problem is SMP.

Nonphysician clinics, driven by profit motives, as well as surgeons from around the world have capitalized upon large FUE sessions as more and more patients demand this type of surgery. It has become a lucrative business that is relatively much easier to perform than traditional strip hair transplantation. Illegal nonphysician marketing teams have appeared on the market to promote and encourage new physicians to enter the hair restoration field. These marketing teams teach these new physicians how to recruit their patients for hair restoration services. Teams of surgical technicians are then supplied to actually perform the surgery on the doctor's patients. Unfortunately, medical boards have been slow to react to this practice.

Without strategic planning for these patients, a new phenomenon has appeared: a see-through, moth-eaten balding/thinning donor area. For this reason, the SMP process has become an essential tool for doctors to treat the donor area. This has created an opportunity for physicians to address these patients' new needs. If good strategic planning had been implemented by skilled surgeons, smaller numbers of FUE grafts would be augmented by SMP, producing fewer complications, less moth-eaten donor areas, less emotional stress on these patients and at a lower overall cost to the patients. When patients of Asian or African descent with their lower donor densities are harvested with FUE, smaller FUE cases can minimize visible donor area depletion (i.e., less donor area thinning/balding).

CONCLUSIONS

Two newer cosmetic modalities (FUE and SMP) have recently been combined for the treatment of alopecia. Dermatologists, plastic surgeons, and many other providers interested in supplying these services to their patients can easily add these modalities to their practice. Physicians who acquire SMP skills can offer many of their patients' solutions for their hair-thinning problems. The new FUE technology has become more easily adopted by doctors entering the hair restoration field when compared with traditional strip surgery. When implanters are used during the surgery, the learning time goes down as does the duration of the surgical procedures. For the doctor willing to get trained in FUE hair transplantation and SMP, these doctors can increase the scope of the services they offer and begin addressing newer procedure driven treatments for alopecia to their existing patients.

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