

Advancements in non-shaven techniques for long hair restoration

Abstract

The advancement and refinement of the non-shaven FUT long hair (FUL) procedure over the years has gained in achieving optimal aesthetic results with few side effects. According to the evaluation of various hair and scalp parameters the indications of the non-shaven FUT long hair (FUL) restoration will be compared to other hair transplant procedures such as FUE or conventional FUT.

FUL allows the definitive treatment of various alopecia with a minimal postoperative aesthetic embarrassment and few remaining scars compared to the great amount of transplanted hairs available and the less important remaining scars rather than after the FUE procedure.

Keywords: hair transplant, FUT long hair, FUE, non-shaven FUT, follicular unit transplant, androgenetic alopecia, scarring alopecia

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Pierre Bouhanna

Director of the DU of Pathology and Scalp Surgery (Paris Sorbonne University) Paris

Correspondence: Pierre Bouhanna, Centre CMCC Paris, 23 avenue Niel 75017 Paris, France, Tel +33-1-42-27-15-44, Email pierrebouhanna@yahoo.fr

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Abbreviations: FUE, follicular unit extraction; FUT, follicular unit transplant

Introduction

In recent times, significant advancements have been made in aesthetic surgery for both male and female pattern baldness, as well as scarring alopecia. These advancements include a variety of techniques and improved understanding of their effectiveness, enabling surgeons to tailor their approach more precisely. This chapter focuses on three techniques - FUT, FUE, and FUT long hair (FUL) - primarily distinguished by their harvesting methods. The selection of technique depends on various factors such as the extent and location of hair loss, patient demographics (gender, age, and ethnicity) scalp and hair characteristics, and the progression of alopecia. A comprehensive classification system considering these factors aids in selecting the most suitable treatment, with a digital phototrichogram assisting in the initial assessment.

The concept of long hair grafting technique was introduced by the author three decades ago,¹ based on logical reasoning and empirical evidence, alongside the discovery of new surgical methods. This method, especially effective when combined with preoperative minoxidil use, allows for grafting without the need to shave the patient's hair, utilizing long hair follicular units.^{2,3}

When the FUT long hair method is indicated, it is not necessary to shave the patient's hair, allowing the long hair FUs to be used during grafting. For the FUE method, it is necessary to shave the hair from the patient's donor area in order to facilitate the handling of the FUE equipment. Follicular units are harvested either through strip harvesting (FUT)⁴ or follicular unit extraction (FUE),⁵ each method having its own set of limitations and advantages. The choice between them is influenced by factors like scalp elasticity, hair density, hair shape and color, extent of baldness, required number of follicular units, and the choice of the remain scarring.

Goals

The primary objective is to prepare follicular units containing 1 to 4 hairs by segmenting a strip of unshaved scalp (FUL) using a stereomicroscope, weighing the pros and cons carefully. The ultimate goal is to recreate a natural hair growth pattern in areas of baldness,

regardless of the patient's gender identity. Additionally, this technique can be employed to conceal visible scars or restore hair in areas like the eyebrows or beard.

Before the procedure, the designated transplantation area is outlined with the patient's consent, typically under local anesthesia (anesthetizing cream and nerve blocks). During the procedure, 1000 to 4000 hair strands are redistributed into the thinning or balding areas, typically performed as an outpatient procedure.

Follicular units for long hair (FUT long hair-FUL)

Donor area: Preparation of follicular units

Long hair follicular unit segmentation from the unshaved occipital donor region involves taking out a strip about 10-30 cm long and 10-20 mm wide, depending on the desired follicular units and scalp laxity (Figure 1a). Closure of the donor area can be done using either a resorbable suture with 3/0 thread or skin staples (Figure 1b). The strip is dissected under a stereomicroscope parallel to the hair bulbs, considering the number, size, and shape of grafts needed (Figure 1c). Grafts, ranging from 500 to 2000 (equivalent to 1000 to 4000 hairs), are then placed in a receiving tray filled with chilled saline solution^{1,6,7,8,9} (Figure 1d, e).



Figure 1a Harvesting of a strip with long hair.



Figure 1b Running suture for closure of the donor area.



Figure 1c Stereo-microscopic segmentation of FUT long hair (FUL).

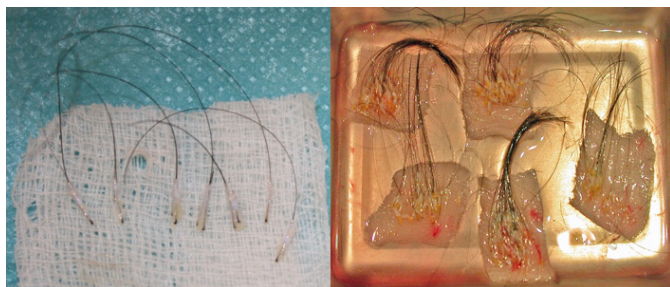


Figure 1d, e Follicular units for long hair (FUL) after segmentation.

Implantation of the recipient area

Implantation into the recipient area involves creating sites with microsurgical blades or hypodermic needles, into which the grafts are delicately inserted using forceps or choi implanters (Figure 2a). Each follicular unit is carefully handled with microsurgery forceps (Figure 2b). It is feasible to transplant up to 500 to 2000 follicular units in a single session.



Figure 2a Instruments needed for surgery: needles and microsurgery blades.



Figure 2b Microsurgical forceps (straight or curved) for grafts insertion.

The advantages of FUL

- For the patient

The FUL procedure offers patients immediate postoperative camouflage for both donor and recipient areas, thereby preventing any potential aesthetic concerns (Figure 3a, b, c). Following surgery, patients may experience two outcomes with their long hairs: either experiencing normal hair loss within the second week post-surgery, with regrowth typically occurring three months later, or witnessing continued growth, possibly due to medical treatments like minoxidil lotion² (Figure 3b).



Figure 3 a, b, c Before (a) and immediately after (b) | FUL session on the front, aspect of the donor area (c).

- For physicians

FUL enables a prompt and improved assessment of hair shaft orientation and angling during insertion (Figure 4a, b). It also facilitates better decision-making regarding the use of thin or thick hair shafts or the selection of hair color during the creation of the anterior frontal hairline (Figure 5). With FUL, a substantial amount of hair can be harvested per session (up to 4000 hairs).



Figure 4a Frontal hairline with multiple micro-incisions.



Figure 4b Immediate aspect after insertion of FUL, the new implanted hair are combed.



Figure 5 a, b A frontal region grafted with FUL allows a better choice of orientation, size and color of hair.

- Two considerations arise

Firstly, after the initial strip harvesting, a single long and hopefully thin scar may remain visible if the hair is shaved or cut very short.

Secondly, the donor scalp often regains sufficient laxity to accommodate subsequent harvesting sessions without tension, even incorporating the initial scarline.

About FUE remaining scars

In FUE, follicular units are directly extracted from the donor zone, resulting in hundreds to thousands of tiny, round, white scars.

Anyway, the advantage of FUE lies in the ability to maintain relatively short hair styles. However, it is noted, as Walter Unger has stated,¹⁰ that the number of remaining scars in the donor area is significantly higher after FUE compared to FUT or FUL (Figure 6), mathematically five times more (Table 1).



Figure 6 Scarline of a FUL harvesting and round scars of FUE (2 arrows).

Table 1 Comparing area of scars after FUE or FUT-FUL harvesting

	2000 x 0,8 FUE punch	Strip = 20 cms x 1 cm
Scarline Area	$\pi r^2 \times 2000 = (3,14 \times 0,4^2) \times 2000$ = 10 cm ²	2000 FU's according to 100 FU/cm ² 20 cms x 0,1 cm = 2 cm ²

The disadvantage of FUL

To avoid a noticeable straight scar, a technique known as “trichophytic technique” can be utilized. This method entails removing approximately 1mm of the epidermis at the lower border of the strip excision. This allows hair to grow through the epidermis, thus diminishing the visibility of the scar line. This approach mirrors the process that the author have developed for the frontal hairline of a scalp flap.¹¹ If a patient prefers to regularly shave their scalp and the scar becomes noticeable, alternative treatments such as follicular unit extraction (FUE) (Figure 7 a-b) or scalp micro pigmentation (SMP) can be considered.

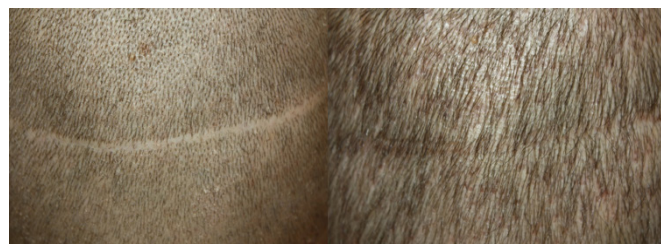


Figure 7 a, b Scarline of a FUL harvesting and after correction with some FUE.

Hair transplant FUT long hair (FUL) indications

The goal is to establish a balanced harmony between aesthetic considerations including age, ethnicity, gender, and psychological factors, and the assessment of parameters for various classifications, alopecia progression, donor area capacity, and surgical feasibility^{12,13}

The techniques outlined in this section are not only applicable to male or female androgenetic alopecia but also to alopecia resulting from trauma, burns, post-radiotherapy, post-endocrine-induced alopecia after breast cancer, transsexuals, traction alopecia in African-descent, and for restoring beard or eyebrow hair. The selection of follicular unit transplantation technique depends on the extent and location of alopecia, scalp flexibility and donor area density, as well as the patient’s gender, age and ethnicity.

Androgenetic alopecia

Parameters of the Bouhanna multifactorial classification are assessed, including bald and hairy area size, scalp laxity and thickness, hair density, colour, and length¹⁴ (Figure 8).

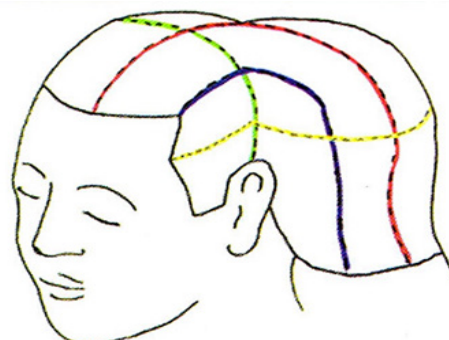


Figure 8 Androgenetic multifactorial classification with the four axes evaluation.

The phototrichogram, introduced by Bouhanna in 1983,^{15,16} objectively evaluates the scalp using a digital camera (Figure 9). Currently, tricholab[®] and trichoscale[®] evaluations are used.

TrichoScale[®] result

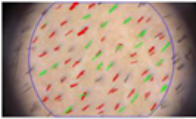
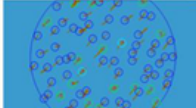
	Follicular units	70
	Units (1 hair)	53 (75,71%)
	Units (2 hairs)	15 (21,43%)
	Units (3 hairs)	2 (2,86%)
	Units (4 + > 4 hairs)	0 + 0 (0%)
	Follicular Unit density	77,5/cm ²
	Hair mean / unit	1,27

Figure 9 Digital trichoscale[®] evaluation of the donor area.

Male androgenetic alopecia

Male baldness degree is categorized into three stages based on the Hamilton-Norwood classification.^{17,18}

For the author it's essential to estimate the required number of transplanted hairs rather than graft counts, as not all grafts may succeed (Figure 10).

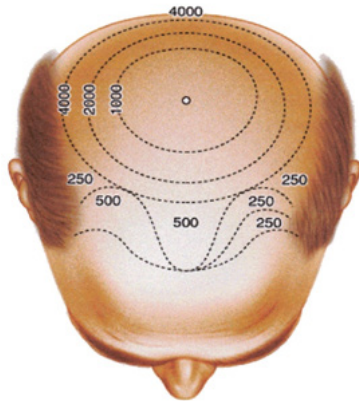


Figure 10 Number of hairs required according to the location and the degree of the bald area to be transplanted

Stage I: (Hamilton II-III) requires 1500 to 3000 hairs in one session.

Stage II: (Hamilton IV-V) needs 3000 hairs (5000 with associated crown alopecia) in 1-2 sessions (Figure 11a, b, c).

Stage III: (Hamilton VI-VII) necessitates up to 7000 hairs in 2 sessions (Figure 12 a, b, c).



Figure 11 a, b, c Male androgenetic alopecia (stage II) after 1 session FUL (2200 hairs) (a, b) The thin scarline (c).



Figure 12 a, b, c Male androgenetic alopecia (stage III) after 2 sessions FUL (7000 hairs) (a, b) The scarline = blue arrow (c).

Patients experiencing early baldness may have insufficient donor supply for successful transplantation, thus requiring medical hair treatment in conjunction with transplantation.³

For the author the oldest patient to receive a transplant was 87 years old. Combining FUE and FUT long hair (FUL) techniques in advanced baldness (Norwood type V-VII) allows for harvesting more follicles, enhancing coverage efficiency.^{19,20}

This allows a better restoration of the extensive baldness. We choose to start first by removing the donor strip (FUT-FUL) in 1 to 3

sessions hopefully with the same scar and at the end finish eventually with one FUE session.

Female androgenetic alopecia

Female baldness is graded by the Ludwig classification²¹ into three stages:

Stage I: moderate baldness on the vertex, treated with 1000-1500 hairs in one session (Figure 13 a, b)

Stage II: alopecia behind the frontal line, treated with 1500-2000 hairs in one or two sessions (Figure 14 a, b).

Stage III: significant vertex alopecia, treated with 2000-2500 hairs in two sessions (Figure 15 a, b, c).



Figure 13 a, b Female androgenetic alopecia (stage I) after 1 session FUL (1500 hairs).



Figure 14 a, b Female androgenetic alopecia (stage 2) after 2 sessions FUL (2000 hairs).



Figure 15 a, b, c Female androgenetic alopecia (stage 3) after 1 session FUL (1400 hairs) (a, b) The scarline = blue arrow (c).

For the author, the oldest female patient treated was 83 years old (Figure 16 a, b, c). A medical hair treatment is always combined with the hair transplant indication³



Figure 16 a, b, c Female androgenetic alopecia (stage 2- 83 yrs) after 1 session FUL (1100 hairs) The scarline = blue arrow (c).

In Transsexuals

The aim is to address frontal recessions and create a feminine frontal line (Figure 17 a, b, c).



Figure 17 a, b, c Transgender alopecia (55 yrs) after 1 session FUL (2200 hairs) The scarline (c).

Other alopecia

Post-breast cancer androgenetic alopecia²² (Figure 18 a, b, c). Traction alopecia, more common in African-descent, results from repeated hair pulling^{23,24,25} a definitive fronto-temporo-occipital alopecia may occur. FUL transplant is indicated 6 months after cessation of traction. For the author's experience, curly hair harvesting is easier with FU segmentation (FUT-FUL) than FUE (Figure 19 a, b, c) (Figure 20 a, b).



Figure 18 a, b, c Female androgenetic alopecia after breast cancer treatment after 1 session FUL (1200 hairs) (a, b) The scarline (c).



Figure 19 a, b Female African-descent traction alopecia after 1 session FUL (1200 hair).

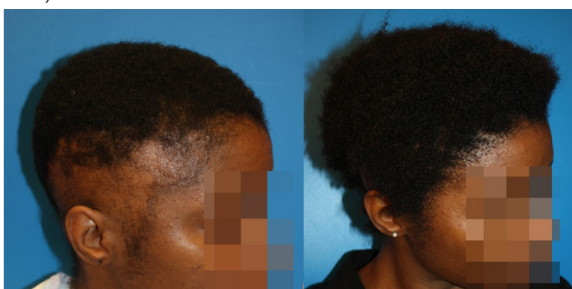


Figure 20 a, b Female African-descent traction alopecia after 1 session FUL (2400 hair).

Stable pseudopelagic alopecia. Scarring alopecia after burns or after radiotherapy¹² (Figure 21 a, b)



Figure 21 a, b Female post-radiotherapy alopecia for a malignant brain tumor after 1 session FUL (2200 hairs) FUL on both temporal areas.

Regarding eyebrow or beard alopecia,²⁴ to achieve a natural aesthetic result, it is important to cut the harvested strip (2 to 3 cms long) into 1-hair FUs. This is easier with the long hair FUL, as it allows for the selection of each appropriate hair and its implantation while respecting the obliquity and orientation.

Conclusion

Our daily practice continues to employ the unshaved strip follicular unit long hair grafting technique (FUL) for various indications. While the fundamentals have remained unchanged for the past three decades, significant advancements have been made due to improvements in graft preparation techniques and the insertion of follicular graft units. The objective is to restore each individual's scalp in accordance with a precise hair evaluation and the selection of the appropriate follicular unit transplantation method, whether FUE, FUT-FUL, or a combination thereof. It is crucial to bear in mind that most cases of baldness are progressive in nature and always require a harmonious balance between the donor and the recipient areas.

Acknowledgments

None.

Conflicts of interest

The author declares no conflict of interest.

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