

# Hairline Design and Frontal Hairline Restoration

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## KEYWORDS

- Hairline • Naturalness • Transition zone • Lateral hump • Frontal tuft • Frontal-temporal angle
- Lateral epicanthi line • Temporal point

## KEY POINTS

- Do not make the hairline too low.
- Do not flatten or totally fill in the frontal temporal angle.
- The frontal temporal angle lies and remains on the lateral epicanthal line as hair loss progresses.
- Take future hair loss into consideration when planning the hairline.
- The frontal hairline consists of micro-irregularity and macro-irregularity.

 The authors' techniques for creating a natural frontal hairline are presented in a video that accompanies this article at <http://www.facialplastic.theclinics.com>

## INTRODUCTION

Creating a natural hairline is one of the most important elements of a successful hair transplant and many excellent reviews have been written on the subject.<sup>1-6</sup> Patients expect and deserve undetectable hairlines. We are better equipped now to create hairlines that meet this high expectation (Fig. 1A, B). In part, this is a result of the exclusive use of follicular unit (FU) grafts in the hairline region. FU grafts have given us a finer paintbrush with which to create a hairline. Equally important has been a better understanding and recognition of the visual characteristics that make up a normal hairline. Simply using FU grafts without a deliberate attempt to reproduce these characteristics does not guarantee naturalness (Fig. 2A, B).

In other words, to create the most natural looking hairline, we cannot simply use a finer paintbrush; we must also know *how to paint*. There are 2 major skills needed to paint a natural hairline:

1. The ability to locate the appropriate borders of a hairline and adjust these borders based on donor/recipient ratio.

2. The ability to mimic the visual characteristics of a natural hairline at these borders.  
The authors techniques for creating a natural frontal hairline are presented in the (Video 1).

## MAJOR COMPONENTS OF THE HAIRLINE

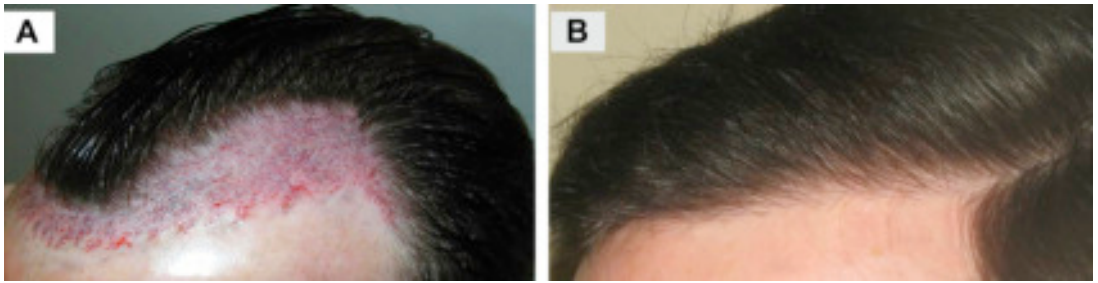
The hairline consists of more than its most anterior frontal border. It is an extended area that consists of a number of borders and zones that work together to frame the face and create the final aesthetic look. These components are briefly described as follows and are illustrated in Fig. 3A, B. They are discussed in greater detail throughout the article.

- Frontal hairline: Frames the front of the face and runs horizontally from temple to temple.
  - Mid-frontal point (MFP): The most anterior point of the frontal hairline in the midline.
  - Mid-pupillary point (MPP): Point lateral to the MFP where the hairline begins to bend posteriorly on a line drawn vertically from the pupil.

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**Fig. 1.** Natural transplanted hairline. (A) Naturally transplanted hairline immediate postoperative pattern. (B) Naturally transplanted hairline 1 year postoperative.

- Transition zone (TZ): The most anterior zone of the frontal hairline. It should appear soft and irregular containing both micro and macro irregularity.
- Defined zone (DZ): Located directly behind the TZ and the point where the frontal hair line begins to appear denser and less see through.
- Frontal tuft (FT): An oval zone overlying the central (midline) portion of the DZ. This is an aesthetically critical area for the appearance of density.
- Frontal temporal angle (FTA): The point where the frontal hairline meets the temporal hairline. It typically lies on a line drawn vertically from the lateral epicanthi of the eye.
- Temporal hairline: Frames the side of the face running from the FTA to the sideburn.
- The lateral hump (LH) or lateral fringe: The strip of hair located on the side of the head in the temporal-parietal region that connects the permanent donor hair below to the mid scalp above. Its anterior border is the temporal hairline.
- Temporal points (TP): A triangular-shaped protrusion located on the lower aspect of the temporal hairline.

## NATURAL CHARACTERISTICS THE HAIRLINE

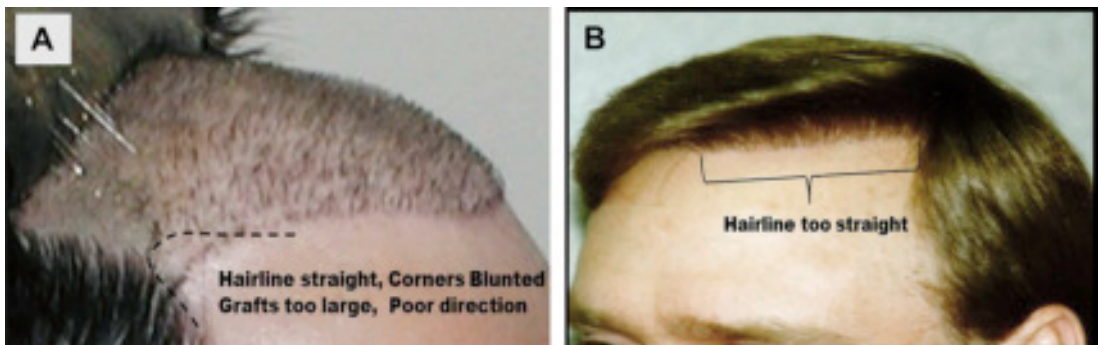
The frontal hairline is an area approximately 2 to 3 cm deep that bridges the bald forehead to the hair-bearing scalp. It can be visualized as an extended area that consists of 3 zones: the anterior portion or TZ; the posterior portion or DZ; and an oval-shaped area in the center of the DZ called the FT (see **Fig. 3A, B; Fig. 4**).<sup>1</sup> All 3 zones make their own unique contribution to the overall appearance of the hairline.

### Transition Zone

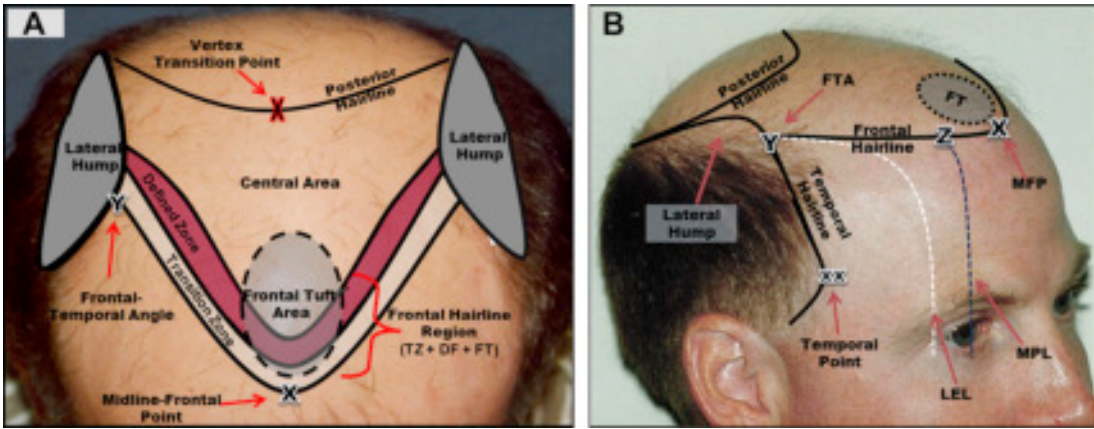
The TZ consists of the first 0.5 to 1.0 cm of the hairline (see **Figs. 3A and 4**). It should initially appear irregular and ill-defined, but gradually takes on more definition and substance as it reaches the DZ. Close observation of normal TZs reveals a number of specific elements that work together to create this overall effect. They are described in the following sections.

### Single hair grafts

One-hair grafts should be used only in the anterior portion of the TZ with a shift toward 2-hair grafts in the posterior portion. This helps ensure a natural, softer look.



**Fig. 2.** Unnatural transplanted hairline. (A) Hairline is too straight, grafts are misdirected, and the FTA has been abnormally filled in. (B) Hairline is too straight with no irregularity, even though only 1-hair FU grafts were used.



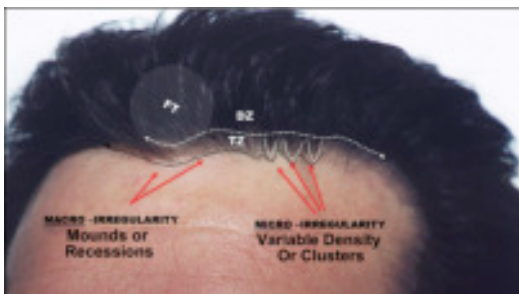
**Fig. 3.** Major borders, landmarks, and zones of the hairline. The hairline consists of many components that work together to obtain the final aesthetic look. (A) Top view. (B) Side view.

### Sentinel hairs

A few isolated, very fine single hairs called *sentinel hairs* can be found scattered randomly in front of the TZ. Sentinel hairs contribute to softness and irregularity.

### Micro-irregularity

Close examination of the TZ reveals small, intermittent clusters of hairs along its border (see **Fig. 4**). These clusters vary in shape and depth but often resemble ill-defined triangles of various sizes. Their existence creates variable and intermittent density along the TZ. This form of irregularity is referred to as *micro-irregularity* because it is more noticeable viewed close-up than from a distance. Parsley called these areas *clusters* and the area between them *gaps*.<sup>7,8</sup> There is a natural mistaken urge to fill in the gaps between these clusters when working on the TZ. This impulse must be overcome to prevent the creation of a straight or solid-appearing hairline.



**Fig. 4.** Micro and macro irregularity. A normal non-transplanted hairline. The *white dotted line* separates the TZ from the DZ. The *black dotted line* follows the macro-irregular undulating anterior border. Notice the micro-irregularity within the TZ. FT is the frontal tuft.

### Macro-irregularity

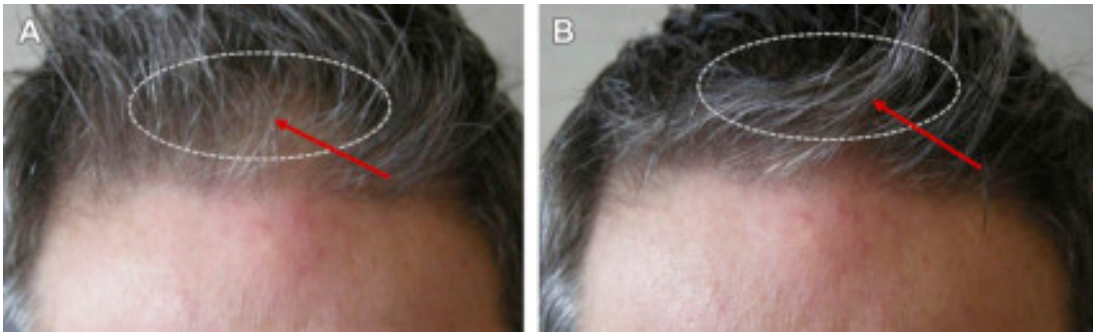
If one stands back and looks at a normal hairline from a distance, the path of the anterior border is seen to be more serpentine or curvaceous than linear. This form of irregularity is referred to as *macro-irregularity* because it is more obvious when one stands back and observes the hairline from a distance (see **Fig. 4**). Martinick used the term “snail-tracking” to describe this appearance.<sup>9</sup> Parsley<sup>8</sup> attributed this macro-irregularity to existence of 1 to 3 “mounds” or “protrusions” along the path of the hairline. Both micro-irregularity and macro-irregularity are needed in the TZ to create a natural-looking hairline.

### Defined Zone

The DZ sits directly behind the TZ (see **Figs. 3A** and **4**). In this area, the hairline should develop a higher degree of definition and density. Increasing density in the DZ creates a fuller looking hairline by limiting the distance seeable through the TZ.<sup>1,10</sup> As a benefit, it creates this effect without placing hair directly in the TZ, limiting the chance of creating an unnatural straight or solid appearance (**Fig. 5A, B**). Increasing density in the DZ is a safe and effective way to make the hairline appear thicker.

### FT Area

The FT is a small but aesthetically significant oval-shaped area that overlies the central portion of the DZ (see **Figs. 3A, B** and **4**). The density in this area should be higher than the rest of the DZ. James Arnold impressed on me the aesthetic importance of density in the FT with the following example.<sup>11</sup> He would say, “Consider a patient who is totally bald except for a fairly full residual FT area. Imagine he is standing in an elevator facing the door



**Fig. 5.** The importance of density in the DZ. (A) The DZ is thinning and the hairline appears to be see through. (B) The hairline looks much fuller but no hairs were added to the TZ. Hair was only manually compressed in the DZ, making it less see through. This indirectly made the TZ look fuller.

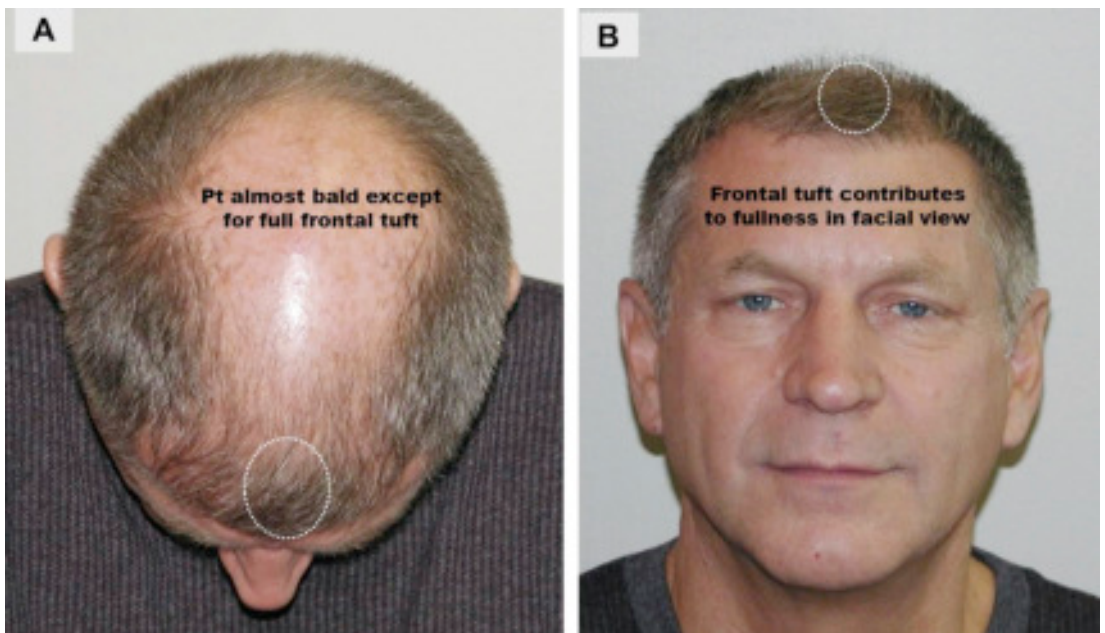
with you facing him on the other side. When the door opens your first impression, looking at him face on, would be of a person with a fairly full head of hair. It would only be when you walked by him that you noticed he was bald everywhere else.” Creating fullness in this area has a tremendous influence on the overall appearance of fullness (**Fig. 6A, B**).

#### **FTA Area**

Slight temporal recession or weakness of the FTA is normal in the white male hairline. Therefore, flattening or densely filling in this recession is a mistake and would make the hairline look artificial

(see **Fig. 2**). Like the TZ, the anterior border of the FTA should not appear solid but instead soft and ill-defined.

In certain ethnic groups (black, Middle Eastern, Asian, and Hispanic), it is more common to see broader, flatter hairlines with less recession. In these groups, if the donor/recipient ratio is good, a more aggressively filled in FTA may occasionally be acceptable. However, even if a flatter hairline is more common in certain ethnic groups, if the donor/recipient ratio is poor, some temporal recession still needs to be created. Female hairlines are the only true exception. With women, the FTA is more medial, rounded, and filled in.



**Fig. 6.** The importance of the FT. (A) From the top view, he looks bald. (B) From a frontal view, the patient appears to have a fairly full head of hair thanks solely to this tuft.

### Proper Angle and Direction

Angle and direction are distinct entities. Angle refers to the degree of elevation that hair has as it exits the scalp. Direction refers to the way hair points (right or left) when leaving the scalp. It is important to pay attention to changes in *both* angle and direction as one transplants different parts of the hairline (Fig. 7A, B). Often there are residual miniaturized hairs that act as a road map for the physician to follow.

- In the mid scalp, hair usually exits at 30° to 45° and points forward toward the nose.
- As one reaches the frontal hairline, the angle becomes more acute at 15° to 20°, and the direction usually remains pointing forward. On occasion, hair in this area may bend slightly to the left or right.
- As one moves laterally along the hairline, the direction remains forward until nearing the FTA.
- As one reaches and sweeps around the FTA toward the temporal hairline, there is a gradual change in direction from forward to inferior lateral. Simultaneously, a gradual change in angle occurs from approximately 15° in the frontal hairline to almost flat (5°–10°) in the temporal hairline.

From a side view, the incisions resemble a fan pointing forward and changing from a medial to lateral direction at the level of the FTA (see Fig. 7A).

- As one continues down the temporal hairline toward the TP, the direction can change to more posteriorly and the angle should be as flat as possible. Coronal incisions should be used in the temporal hairline to ensure a more acute angle.

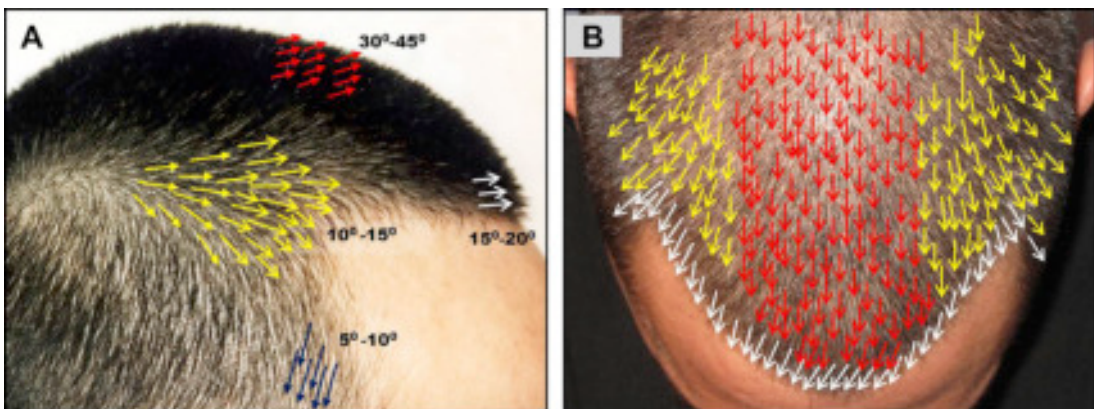
### Selective Distribution of Grafts

Selective distribution is an important tool that helps us mimic the density gradient found in normal hairlines (Fig. 8). It is a safer and more powerful tool than increasing incisional density. For example, at identical incisional densities of 30/cm<sup>2</sup>, 3-hair grafts create 3 times the hair volume as 1-hair grafts. To accomplish the same increase in hair volume *entirely* with incisions would require an increase in incisional density from 30/cm<sup>2</sup> to an unrealistic 90/cm<sup>2</sup>. In general, we use the following selective distribution of grafts.

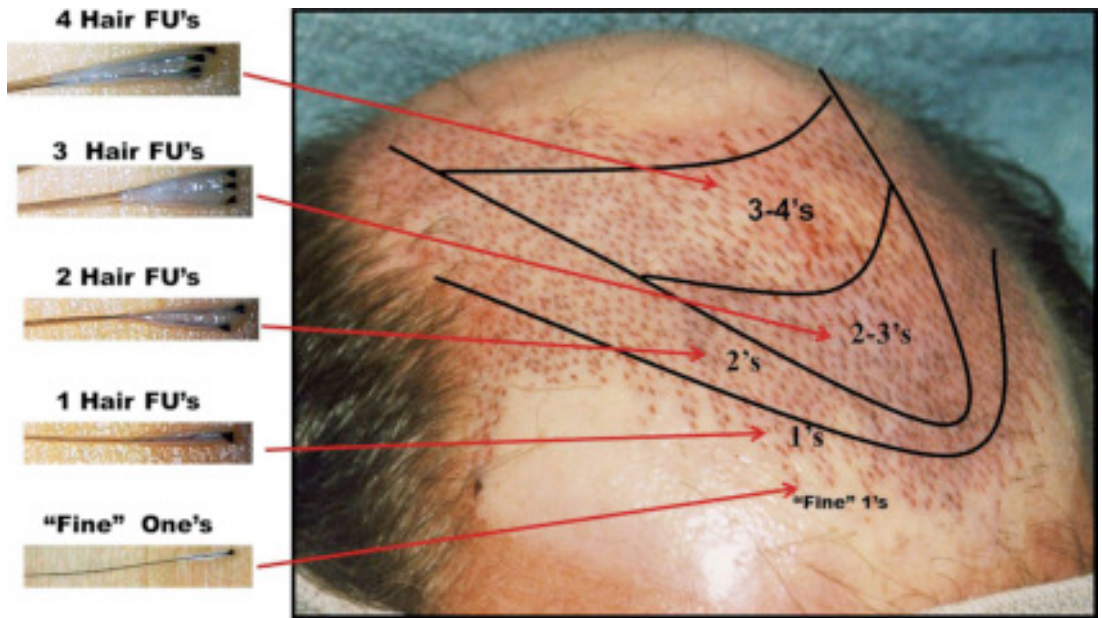
- The TZ contains only 1-hair grafts with a shift to 2-hair grafts toward the posterior aspect of this zone. One-hair grafts can vary in thickness. The finer 1-hair grafts should be used for sentinel hairs and in the most anterior portion of this zone.
- The DZ contains predominantly 2-hair grafts.
- The FT area contains a greater concentration of 3-hair grafts. *Follicular pairing* is a useful tool to use in the FT area if not enough 3-hair grafts are found naturally. With follicular pairing, a 1-hair graft and a 2-hair graft are combined to make an artificial 3-hair graft.<sup>11</sup>

### Graft Numbers and Incisional Density

Physicians learning hair transplantation often ask “How many grafts do I need?” or “What incisional density should I use?” There is no single correct answer. In our experience, incisional densities ranging from 25 to 35 FU/cm<sup>2</sup> are most commonly used. Higher densities are possible, but more controversial with respect to survival, and typically not needed for good results.<sup>12</sup> The frontal hairline measures about 20 to 30 cm<sup>2</sup> if all 3 zones (TZ +



**Fig. 7.** Changes in angle and direction. Exit angles are different in the mid scalp (30°–45°), frontal hairline (15°–20°), FTA (10°–15°), and temporal hairline (5°–10°). Notice the gradual fan-shaped change in direction from medial to inferior/lateral around the FTA. (A) Lateral view. (B) Top view.



**Fig. 8.** Selective distribution of grafts: a powerful tool for controlling density. One-hair FUs are used in the TZ, 2-hair FUs in the DZ, and 3-hair FUs in the FT zone.

DZ + FT) are included. If you do the math, a range of 500 to 1050 FU grafts may be needed. Of these, approximately 200 to 400 are 1-hair grafts placed in the TZ and the rest are 2-hair to 3-hair grafts placed in the DZ and FT area.

Minor changes in incisional density can be used to influence the appearance of fullness. However, incisional density does not change dramatically, typically remaining somewhere near 25 to 35 FU/cm<sup>2</sup>. Caution should be urged against trying to use very high incisional densities in the FT area, where a more fragile blood supply combined with dense packing could lead to necrosis or poor growth.<sup>12</sup>

### Cowlicks

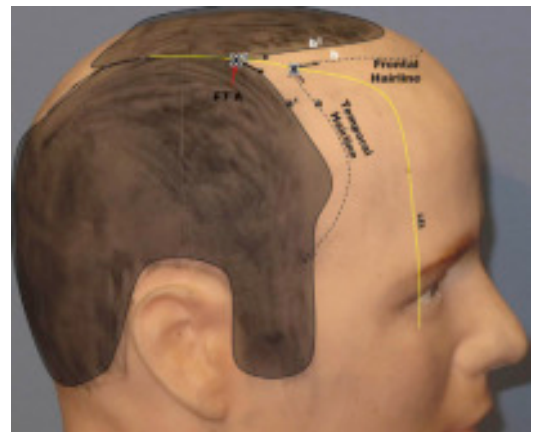
Cowlicks often present a challenge when creating hairlines. They occur more often in women. If a patient has a residual cowlick that is very weak and looks like it will be gone within a couple of years, we usually ignore it. However if a cowlick is strong, we may attempt to use the presence of existing hairs to follow its direction. We usually re-create a cowlick by starting at its periphery, where the direction of hair is obvious, and slowly work inward toward the point of swirl.

### LOCATING THE BORDERS OF THE HAIRLINE

The borders of the hairline consist of a frontal hairline and a temporal hairline that meet at the FTA. When hair loss begins, there is simultaneous

recession of both the frontal and temporal hairline, causing the FTA to move posteriorly and widen. As this process progresses, the FTA moves farther posteriorly and temporal recession deepens. An important observation is that the FTA remains on a line drawn perpendicular from the lateral epicanthi of the eye as hair loss worsens (**Fig. 9**).<sup>1,2</sup>

A primary decision that physicians need to make is how aggressive to be when recreating the



**Fig. 9.** The FTA moves posteriorly as the frontal and temporal hairlines recede. The FTA remains on the LEL as temporal recession deepens.  $x$  and  $x'$  = original and receded FTA;  $a$  and  $a'$  = original and receded temporal hairline;  $b$  and  $b'$  = original and receded frontal hairline.

hairline. By aggressive, we mean how far forward the frontal hairline, temporal hairline, and FTA can be restored with respect to their original position. This is strongly influenced by the relationship between a patient's age, current hair loss, potential future hair loss, and donor supply. Future hair loss is particularly important in younger patients, in whom there is more time for progression to occur. If future loss is not considered, unnatural patterns may be revealed as hair recedes from transplanted areas. With a depleted donor supply this may be difficult to fix.

In general, the younger the patient, the more severe the hair loss, and the poorer the donor supply, the more conservative the hairline should be. It is a matter of supply and demand (ie, donor/recipient ratio). If we had unlimited donor supply we could create aggressive hairlines on everyone. Unfortunately, this is not the case.

If there is any concern, it is better to err on the side of conservatism and follow the basic tenant, "do not place the hairline too low." Following this advice is often difficult, as many patients request hairlines that are lower than prudent.

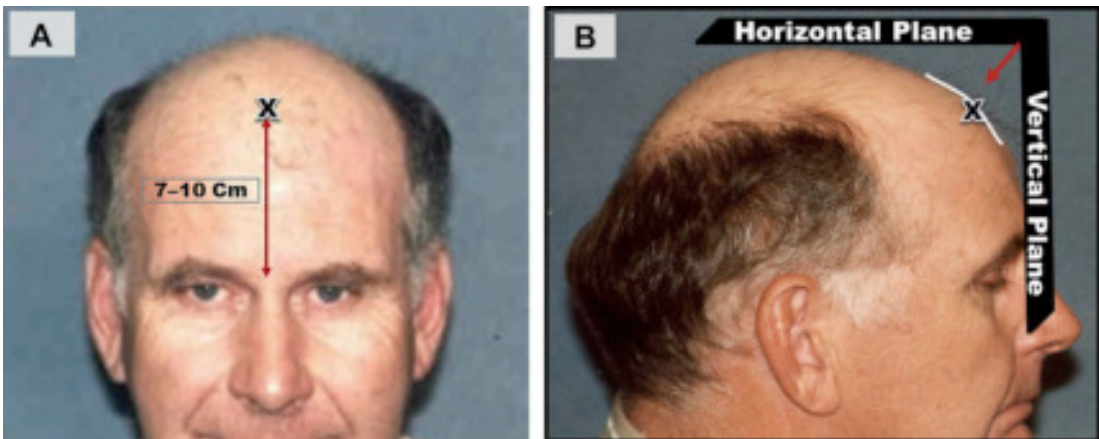
### Locating the MFP

Locating the MFP is one of the first steps in hairline recreation. The MFP is located in the midline and is the most anterior point of the frontal hairline. A number of guidelines can aid in the proper location of the MFP; however, 2 guidelines that should not be used are the "4 Finger Breaths Rule" and Leonardo da Vinci's "Rule of Thirds." The 4 Finger Breaths Rule states that the MFP should be located 4 finger breaths above the glabella. This is unreliable, as fingers vary in size from person

to person. Leonardo da Vinci's "Rule of Thirds" states the perfect face should be divided into equal thirds with the distance between the chin to the nose, nose to the glabella, and glabella to the hairline all being the same.<sup>1,6</sup> However, a hairline located with this rule is meant for a young patient with no hair loss. It is not the reconstructed hairline typically achievable in an alopecic adult with the constraints of a limited donor supply. It would be too aggressive for most patients. More appropriate guidelines for locating the MFP include the following (Fig. 10):

- 7-cm to 10-cm Rule: The MFP lies on point drawn somewhere between 7 and 10 cm above the glabella.
- Curve of the Forehead Rule: The forehead takes on a gentle curve as it transitions from the vertical plane of the face to meet the horizontal plane of the scalp. The MFP usually lies somewhere within this curve. A good starting point is a line drawn to this curve from the intersection of these 2 planes. This places the MFP somewhere in the middle of the curve.<sup>1,2</sup>

These rules are only guidelines and should be adjusted based the patient's age, severity of hair loss, and donor supply. In patients with more severe hair loss, raising the MFP by 1 to 2 cm may be appropriate; however, it should not be placed so high that it falls on the horizontal plane of the scalp where it loses the aesthetic effect of framing the face. In patients with good donor/recipient ratios, the MFP can be placed lower, but caution needs to be exercised. It should never be placed on the vertical plane of the face, as this seldom will look natural in a restored hairline.



**Fig. 10.** Finding the MFP. (A) Seven to 10 cm above the glabella. (B) The middle of the curve that occurs as the vertical plane of the face meets the horizontal plane of the scalp. Adjust the MFP up or down based on severity of hair loss.

A specific situation worth mentioning is the patient who has a very low persistent FT. In this patient, the physician should ignore the hair in the preexisting tuft and place the MFP at a higher, more appropriate point.

### Locating the FTA

As stated previously, all mature male hairlines have an FTA formed by the junction of the frontal and temporal hairlines. The superior arm of the FTA is the frontal hairline and the inferior arm of the FTA is the temporal hairline. The apex of the FTA is where they meet. The FTA moves increasingly posterior as hair loss progresses. In our opinion, locating and deciding how far forward the FTA should be restored when reconstructing a hairline is one of the more important and difficult tasks in hairline design. The following guidelines are useful for locating the FTA.

- The Lateral Epicanthus Line Rule: This rule states the FTA lies on a line drawn vertically from the lateral epicanthus of the eye called the lateral epicanthi line (LEL). An important observation is that the FTA remains on this line as it moves increasingly posterior with worsening temporal recession. The FTA is located at the point where the LEL intersects the temporal hairline (see **Fig. 9**; **Fig. 11**).
- Up-Sloping Line Rule: A line drawn from the MFP to the FTA should always slope slightly upward when viewed from the side. It should never slope downward.

In mild degrees of hair loss (ie, types 3 and 4), in which patients have very little recession of the temporal hair line, these guidelines work well. The *existing* temporal hair usually becomes the inferior



**Fig. 11.** Finding the FTA/LEL. The FTA lies on a line drawn vertical to the lateral epicanthi. The point where the LEL meets the temporal hairline is the FTA. The temporal hairline becomes the inferior arm of the FTA.

border of the FTA, whereas the *future* frontal hairline will become the superior border of the FTA.

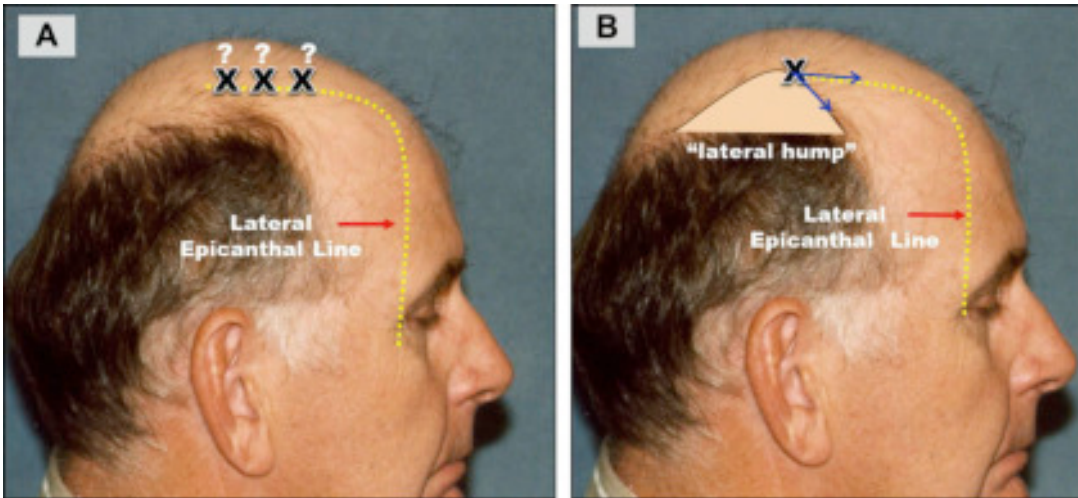
In moderate to severe degrees of hair loss (ie, types 5, 6, and 7), in which the temporal hair has receded, finding the FTA using only the LEL rule is not sufficient. With severe hair loss, the temporal hairline and lateral fringe may have dropped below a point where the LEL can intersect. There is no temporal hairline for the LEL to meet. In more moderate degrees of hair loss, the LEL can still intersect the temporal hairline, but the point of intersection may be farther back than optimally desired. In either case, the following additional guidelines are useful.

- Visualizing and re-creating the LH: The LH is an upside-down C-shaped area located superior to the ear that connects the permanent donor hair below to the mid scalp above. It is the last part of the lateral fringe to recede. If you look at normal lateral profiles you can see that one can be very bald and still retain a residual LH. Visualizing and re-creating an LH gives the LEL a target to intersect to find the FTA. The down-sloping frontal border of the LH, just anterior to this intersection, becomes the superior portion of the temporal hairline. The degree to which the LH travels forward before sloping down and intersecting the LEL will determine the location of the reconstructed temporal hairline (**Fig. 12A, B**).
- Using lines parallel to the sideburns: From a side view, multiple lines can be visualized running parallel to the sideburn and intersecting the LEL. The point where these lines intersect the LEL helps approximate the location of the FTA in different degrees of hair loss. If a patient has severe hair loss or is destined to become a type 6 to 7, we use a line located behind the sideburn. Of interest is that this is similar to the anterior position of the FTA in Beehner frontal forelock design for severe hair loss.<sup>12</sup> If a patient has moderate hair loss, we use a line starting somewhere in the middle of the sideburn. For minimal hair loss with low risk of progression, we can be more aggressive and use a line located just in front of the sideburn (**Fig. 13**). Anything more anterior is potentially too aggressive.

### Determining the Shape and Contour of the Frontal Hairline

Once the locations of the MFP and FTA have been determined, the frontal hairline is created by drawing a gently curving line that connects the MFP to both FTAs. The MFP is an additional landmark that assists in the drawing of this line. The MFP sits on





**Fig. 12.** Finding the FTA/LH. (A) As hair loss advances, the temporal hairline recedes and the lateral fringe drops, making it more difficult to know how far back to place the FTA on the LEL. (B) Visualizing the LH gives the LEL a target it can intersect. The anterior border of the LH becomes the temporal hairline.

a line drawn vertically from the midpoint of the pupil and is the point where the frontal hairline begins to curve more acutely posterior toward the FTA (see **Fig. 3B**).

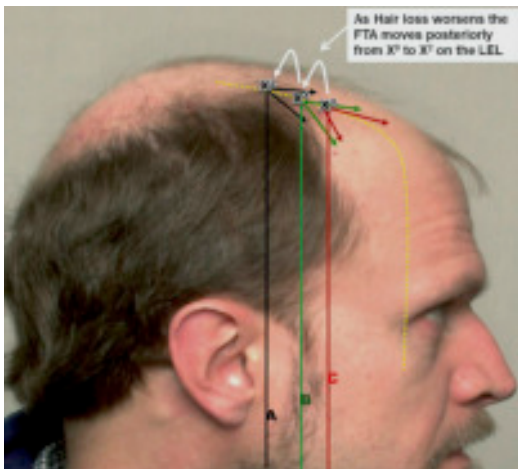
The contour of the frontal hairline can range from round, to oval, to bell shaped. The more conservative a hairline needs to be, the more its shape moves from a rounder shape toward an oval or bell-shaped

design. The increasing lateral concave suppression that occurs as one moves from round to bell shape corresponds to the increasing temporal recession that occurs in more severe hair loss.<sup>6</sup> Beehner<sup>12</sup> visualized creating this concavity by taking his index finger and gently pushing in the lateral border of the hairline. An alternative way that we create this concavity is by making the lateral border of the hairline weaker and more see through. We create this weakness by using more 1-hair grafts at a lower density as we approach the FTA. This basically mimics the process that occurs in nature.

### Adjusting the Hairline Downward

As alluded to earlier, patients often want a lower hairline than recommended. It is not uncommon for them to look at the hairline drawn during a consult and plead for it to be lower. It is imperative for physicians to learn to say “no” to patients in whom the request is inappropriate. However, in some cases there may be some room to adjust the hairline downward. The following are 2 methods we use to accomplish this goal in the safest way possible.

- If the patient wants the midpoint of the hairline to be lower, creating a small widow’s peak is a relatively safe and graft-economical way to do this. Sometimes just a tiny protrusion can be enough to satisfy the patient.
- Other patients are more concerned with temporal recessions and request filling in the FTA by lowering the lateral aspect of their frontal hairline. This would flatten the FTA and look abnormal. If there is enough room, a safer



**Fig. 13.** Finding the FTA/Sideburn Lines. Lines drawn parallel to the sideburn at different distances from the ear help approximate how far forward to place the FTA on the LEL (yellow dotted line) in different degrees of hair loss. Severe hair loss = line behind the sideburn (black line A). Moderate hair loss = line through the middle of the sideburn (green line B). Mild hair loss = line parallel to the anterior border of the sideburn (red line C).

way of lowering the FTA is to visualize its current location and imagine sliding it slightly forward. This moves both the temporal and frontal arms of the FTA and maintains the presence of an angle.

### Temporal Points

Recession of the TP contributes a great deal to the appearance of baldness by making the forehead look larger. Before the use of FU grafts, the TP could not be transplanted naturally. Now, with the use of FU grafts, it can be done. However, this is an extremely visible area that is unforgiving to mistakes. It requires a high level of skill and should not be undertaken lightly by novices. Mayers' classification of temporal hair loss is<sup>13</sup>:

- Normal (N): There is no hair loss or recession.
- Thinning (T): The TP is present but thin and beginning to recede. Transplanting at this stage is not typically necessary.
- Parallel (P): The TP is gone and the temporal hairline from the FTA to the sideburn appears straight and flat.
- Reverse (R): The TP has receded to the point that it has a concave border along the sideburn.

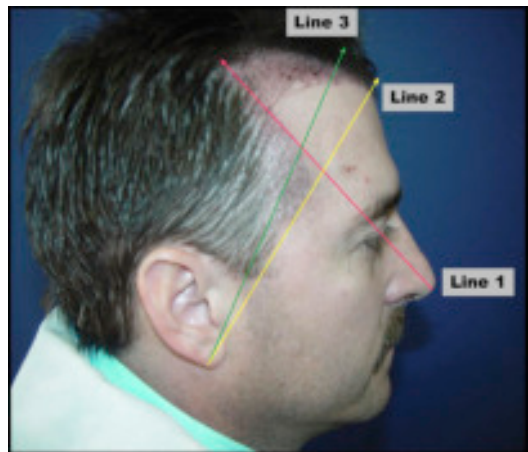
In general, the TP does not need to be transplanted until it reaches the very late T or early P stage.

A common rule for finding the TP is the intersection of the following 2 lines:

- Line 1 is drawn from the tip of the nose, over the center of the pupil.
- Line 2 is drawn from the tip of the earlobe to the proposed MFP.

This rule should be used only as a starting point, as it finds the location of the TP that existed before any hair loss occurred and can be fairly aggressive. Surgeons should use their artistic judgment to finalize the design. We generally prefer to create a more conservative TP with an anterior point closer to the temporal hairline. Haber suggested raising the distal aspect of Line 2 slightly above the MFP to bring the point closer (Fig. 14).<sup>14</sup> Two other useful observations are that the bottom border of the TP is often parallel to the lateral aspect of the eyebrow and the top border should slope gently backward toward the temporal hairline. Often there are miniaturized hairs from the preexisting TP that act as a road map for the location and direction of hair.

The angle of hair in the TP should be flat or as close to 0° as possible. To accomplish this, coronal incisions should be used. The direction of hair points downward and posterior toward the ear.



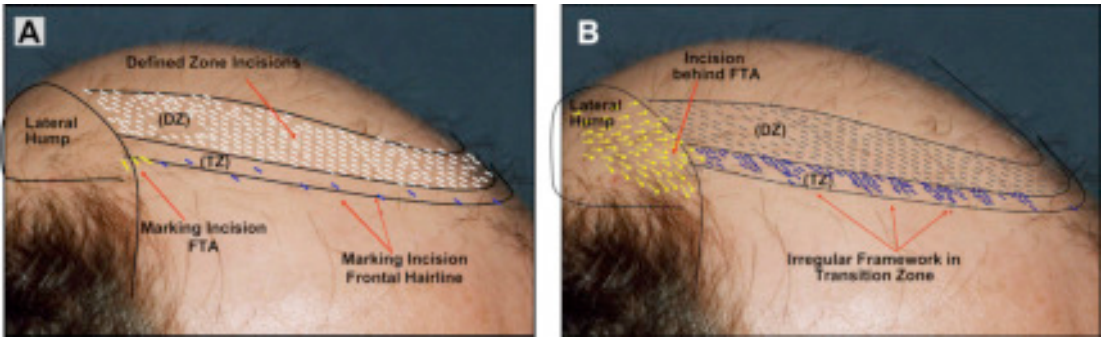
**Fig. 14.** Finding the TP. Common rule for finding the TP is intersection of a line drawn from tip of nose through the pupil (*red line*) and a line drawn from tip of ear lobe to the MFP (*yellow line*). For a more conservative TP, a line slightly superior to the *yellow line* is used (*green line*).

### STEP-BY-STEP APPROACH FOR CREATING A NATURAL HAIRLINE

The following is a step-by-step approach we have found useful when creating our hairlines. It is not meant to be dogmatic. Other methods exist that also work well. With this approach, an initial framework is built that is then repeatedly fine-tuned. We prefer this approach as opposed to completing our design in one pass. We use the analogy of writing a paper. Each time we put it away, when we come back to it we find improvements that can be made. The following step-by-step approach is also illustrated in the video that accompanies this article.

1. Draw the initial hairline design with a marking pen using the guidelines discussed earlier.
  - Find the MFP, MPP, and FTA using the guidelines described earlier in this article.
  - Connect the MFP to the MPP and then the FTA with a gently curved line to create the anterior border of the TZ.
  - After the anterior border of the TZ has been drawn, sketch in the rest of the zones.
2. Check the symmetry of your design.

Symmetry can be checked multiple ways. Looking at the hairline in a mirror or through a camera lens reveals asymmetry. From a frontal view, holding a pencil horizontally at the level of the MFP also reveals asymmetry. One can measure the distance of both FTAs from the midline to see if they are equal. Asking your assistants for their opinions can be helpful. Pathomvanich and Ng<sup>15</sup> recently



**Fig. 15.** (A) Early steps when creating a hairline: Marking incisions (*blue*) along anterior border of the TZ; marking incision (*yellow*) around the FTA. Incisions (*white*) in the DZ are done before working on the TZ. (B) Later steps when creating a hairline: Incisions (*blue*) are made in front of the DZ and into the TZ in an irregular wavy pattern of varying depth. Incisions (*yellow*) are also made behind the FTA changing in direction from medial to inferior lateral around the FTA.

described the use of a laser light leveling device. Unique aides that have been specifically created to check for hairline symmetry are Pathomvanich and Ng’s laser leveling device and Cole’s “aid to hairline design” measuring device.<sup>15,16</sup>

3. Make initial marking incisions along the anterior border of the TZ and in the FTA.

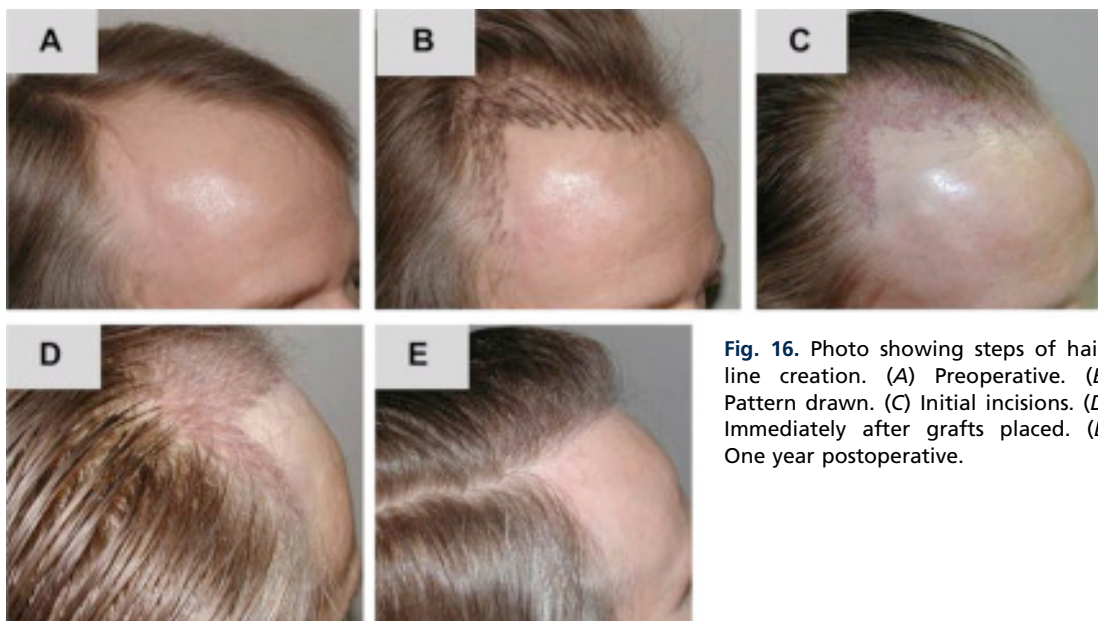
Marking incisions preserve the location of the hairline design even if the lines drawn with the marking pen are washed off. Placing these initial marking incisions at various distances from the DZ begin the process of creating irregularity (**Fig. 15A**).

4. Make incisions in the DZ first.

Making incisions in the DZ first and then moving anteriorly into the TZ gives me more control over the shape and irregularity of our TZ. We make the analogy to painting a wall. We do the easy central part first and then move to the more delicate fine trim last. Incisions in the DZ are placed in a staggered pattern (see **Fig. 15A**).

5. Move to the TZ and create the initial framework of irregularity.

Incisions are now made in front of the DZ and into the TZ in an irregular wavy pattern of varying depth.



**Fig. 16.** Photo showing steps of hairline creation. (A) Preoperative. (B) Pattern drawn. (C) Initial incisions. (D) Immediately after grafts placed. (E) One year postoperative.

Some physicians freehand this pattern. Others will start by connecting the DZ to the irregularly spaced initial marking incisions created earlier. Either technique is meant to begin an initial framework of irregularity that will be refined with further passes (see **Fig. 15B**).

#### 6. Make multiple passes in both the DZ and TZ.

Multiple passes and artistic skills are used to increase density in the DZ and fine-tune the irregularity of the TZ.

#### 7. Final fine-tuning with the “stick-and-place” technique.

About 100 to 300 grafts are usually saved for the end of the procedure, to further fine-tune the hairline. The physician can get an aesthetic preview of the way the hairline will look and what is needed because the hairs have been left 2 to 4 mm long.

### SUMMARY

The principles and techniques outlined in this article will help the physician create hairlines with the high degree of naturalness and substance expected by today’s discerning patients (**Fig. 16**). It is not enough to “just use FU grafts.” Finding the appropriate borders and then mimicking the natural characteristics of a hairline at these borders are the skills needed for success. My approach is to create an initial framework based on the principles of hairline design and then use artistic ability and experience to fine-tune this framework.

### SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at <http://dx.doi.org/10.1016/j.fsc.2013.06.001>.

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