

Consecutive Transposition Flaps for the Management of Slot Formation after Alopecia-Reducing Surgery

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Alopecia-reducing procedures were first introduced to the field of cosmetic hair restoration surgery in 1977¹ and have advanced to the point that large areas of baldness can be treated very effectively and expeditiously (Fig. 1). The most aggressive of the alopecia-reducing procedures is called scalp-lifting (undermining down to the hairline of the nape) (Fig. 2) and consists of the lateral lift (Fig. 3a),² the bilateral occipitoparietal lift (Fig. 3b),³ and the bitemporal lift (Fig. 3c).⁴ These procedures are usually used to correct posterior baldness while hair grafts are used for frontal hairline restoration (Fig. 3d).⁵ Although incredible results can occur with this methodology, it is not without its difficulties. One of the most formidable of these problems is slot formation with divergent hair direction. This problem can develop after multiple alopecia-reducing procedures are carried through (Fig. 4). In an excellent study performed by Nordstrom⁶ in 1983, he demonstrated that the total length of the bald area increases by approximately 10% of its total length with each progressive operation. This increased length in the posterior region can cause a severe cosmetic deformity, especially in patients who are extensively bald and have had several of these procedures.

In an attempt to manage this problem, several modalities have been proposed in the past. Fleming and Mayer⁷ recommended that multiple Z-plasties be performed along the entire length of the scar. This technique, however, creates approximately three times more scar tissue and does not significantly change the hair direction (Fig. 5). As an alternative, Frechet⁸ recommended performing scalp reductions only to the top of the head and allow-

ing a bald area to develop inferiorly (Fig. 6). This too was no panacea, primarily because the bald area was so far posterior that it was difficult to create an aesthetically pleasing result with hair grafts.

Finally, in 1990, Frechet developed an excellent technique that provided good hair direction and minimal scar detection at the crown. He recommended double hair-bearing transposition flaps⁹ for minimal slot formation

and triple hair-bearing transposition flaps¹⁰ for deep slot formation (Fig. 7).

PROBLEMS WITH USING A TRIPLE FLAP METHOD

After having used the double and triple hair-bearing transposition flap technique for deep slot formation for two years, the author found the primary problems to be the following:



Figure 1a. Patient with extensive baldness from the front view preoperatively immediately before a bilateral occipitoparietal scalp-lift.



Figure 1b. Same patient after a bilateral occipitoparietal scalp-lift and immediately before a bitemporal scalp-lift.



Figure 1c. Same patient two scalp-lifts and three hair-grafting sessions of mini-micrografts to the hairline zone.

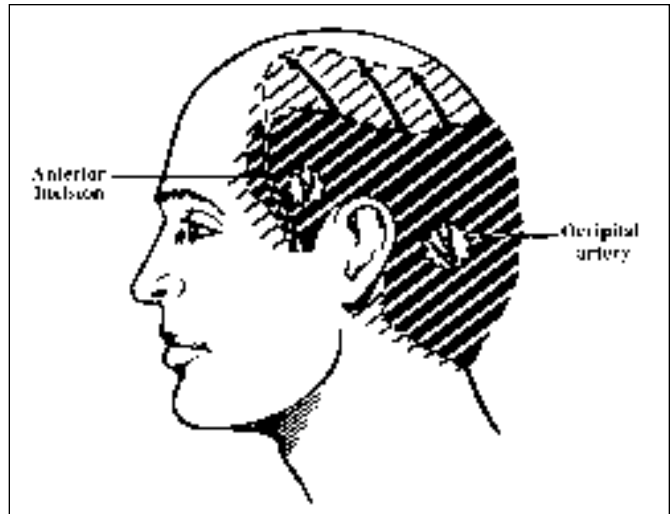


Figure 2. The aggressive undermining of the entire scalp down to the hairline of the nape is called scalp-lifting and allows dramatic improvements for patients with extensive baldness.

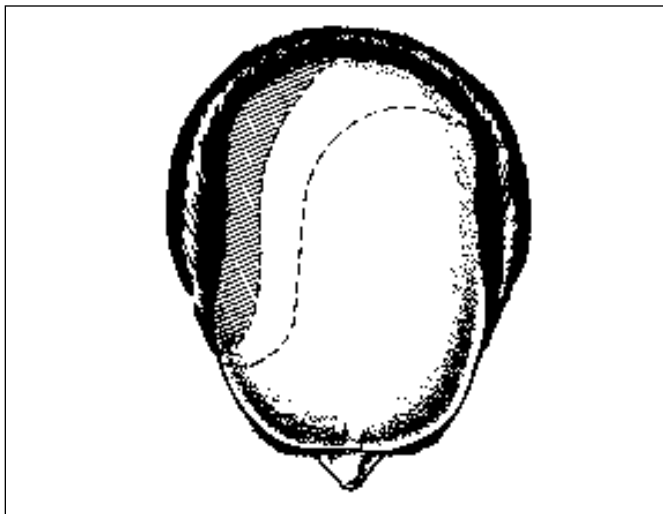


Figure 3a. Schematic of the lateral scalp-lift (extensive undermining) compared to a paramedian scalp reduction (limited undermining).

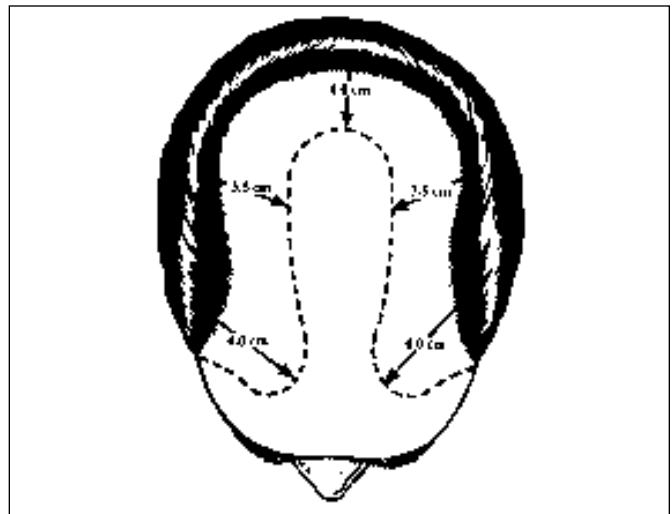


Figure 3b. Schematic of the bilateral occipitoparietal scalp-lift.

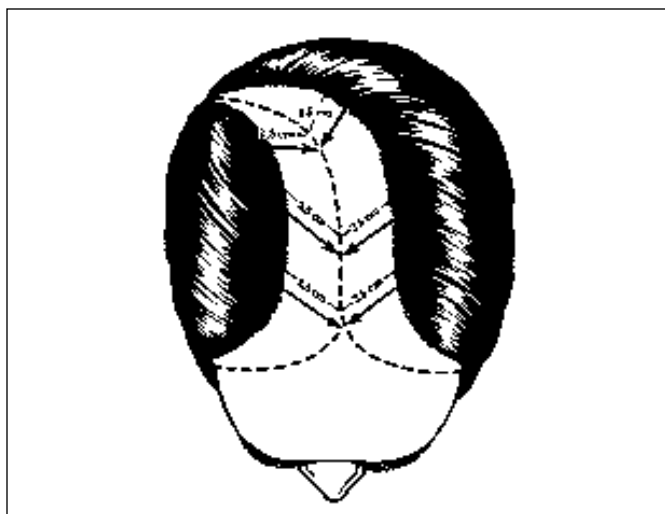


Figure 3c. Schematic of the bitemporal scalp-lift.



Figure 3d. Hair grafts are placed frontally.



Figure 4a. Patient from the back view before a BOP lift.



Figure 4b. After the BOP lift and before the BT lift.

1. Necrosis can develop at the distal portion of flap #3 because there is a scar that completely traverses the base.
2. Too much of the scalp laxity is taken up from the parietal areas, which makes it difficult to combine the procedure with donor harvesting for hair-grafting.
3. It is technically difficult to perform a double or triple hair-bearing transposition flap technique.
4. The two juxtaposed superior flaps create a scar line, which may experience hair loss in the future.

METHOD

Because of these problems, the author began utilizing consecutive single transposition flaps (spaced three to four

months apart) in combination with hair transplantation surgery. This approach, which has been effectively used since 1992, is carried out as follows:

Step 1

A patient presents with a deep slot after sequential midline inverted-J scalp reductions (Fig. 8a) and no hair frontally. After a previous lengthy discussion about the technique, the patient comes to the office, signs the appropriate consent forms, and is orally administered 20 mg of diazepam and two oxycodone tablets. While this medication is taking effect, Bonnie Blue ink is used to mark the proposed transposition flap (Fig. 8b). This proposed marking should be drawn so that the superior flap will eventually lie at the beginning descen-

sion of the posterior scalp. The length of the flap is usually 4 cm and the base 2 to 2.5 cm. The base will, of course, vary with the innate scalp laxity of the patient. At the same time, the proposed donor site should be scribed on the side opposite from where the superior flap will be transposed. It is also important to leave at least 3 to 4 cm between the donor harvest and the Z-plasty so that blood supply to the Z-flaps will not be compromised in any way.

The frontal hairline is then marked in, and upon the completion of all markings, a ring block anesthesia is performed, beginning immediately below the proposed donor harvest, and extending around the area anterior to the proposed hairline. After this block has taken effect, the surgery is begun.



Figure 4c. Slot formation development after the BOP and BT lifts.

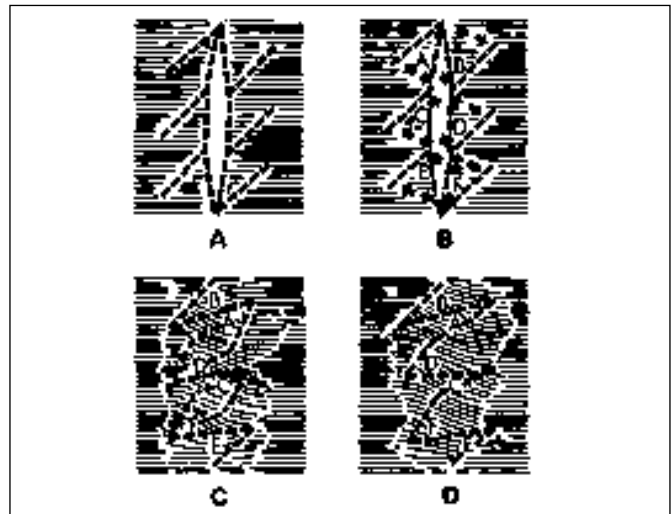


Figure 5. Multiple Z-plasties along the midline scar create approximately three times the amount of scar tissue but do not significantly change the hair direction.

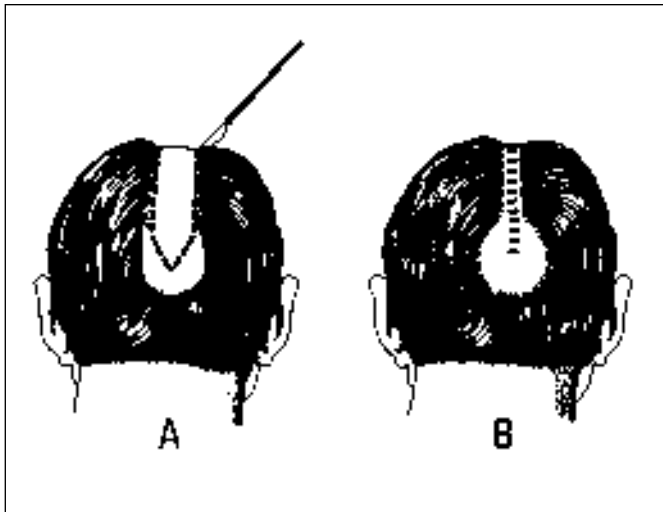


Figure 6. Limiting midline scalp reductions to the upper portions of the scalp leaves a bald area inferiorly that is very difficult to treat with hair-grafting.

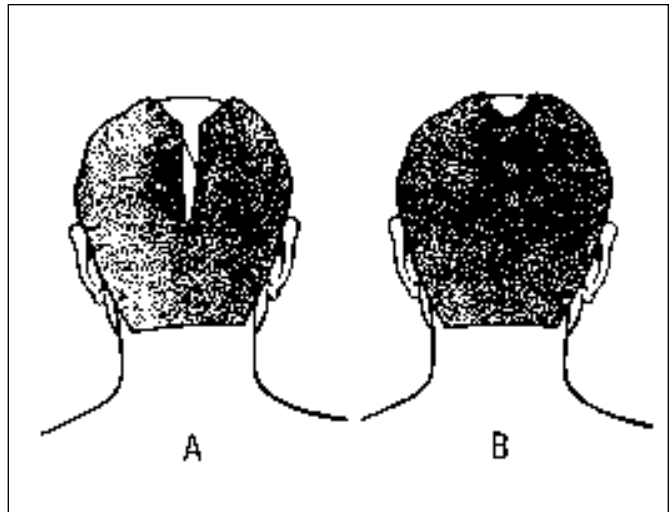


Figure 7. The triple transposition flap technique of Frechet for the treatment of deep slot formation. Because a scar transects flap #3, necrosis can sometimes occur in flap #3. Additionally, significant laxity is taken up from both occipitoparietal areas

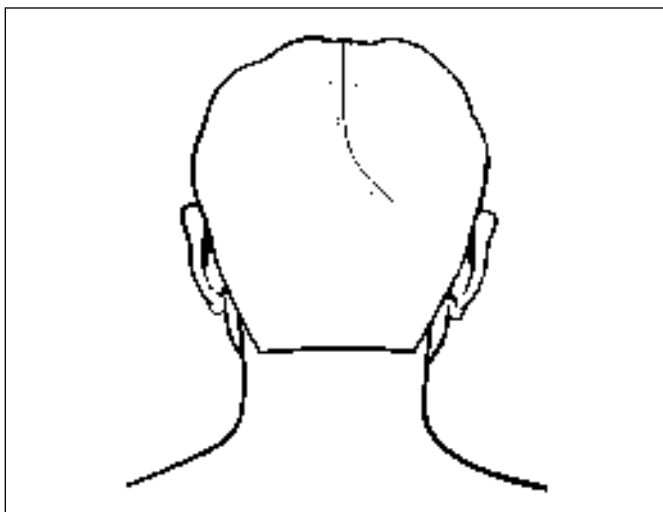


Figure 8a. Schematic demonstrating slot formation from inverted-J scalp reductions.

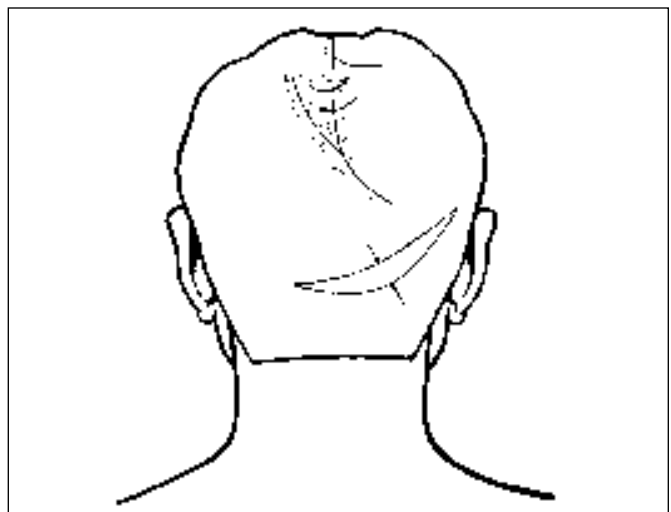


Figure 8b. Schematic demonstrating the preoperative markings for both the flaps and the donor harvest. The arrows indicate the movement of the flaps.

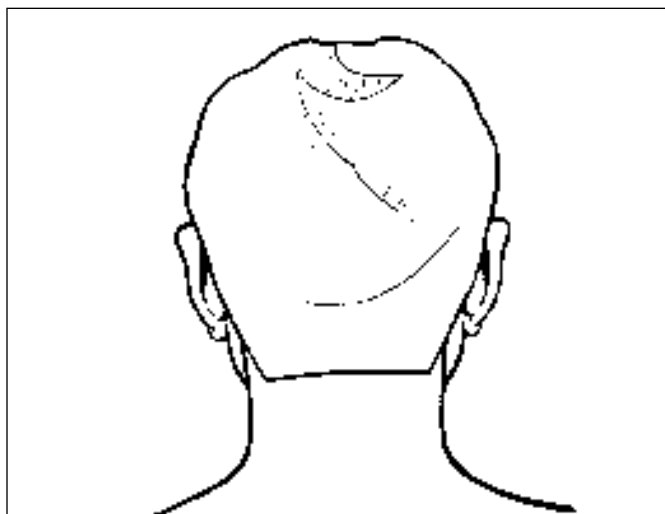


Figure 8c. The flaps are transposed in a Z-plasty fashion and sutured into place. An ellipse is removed as a donor harvest and subsequently closed.

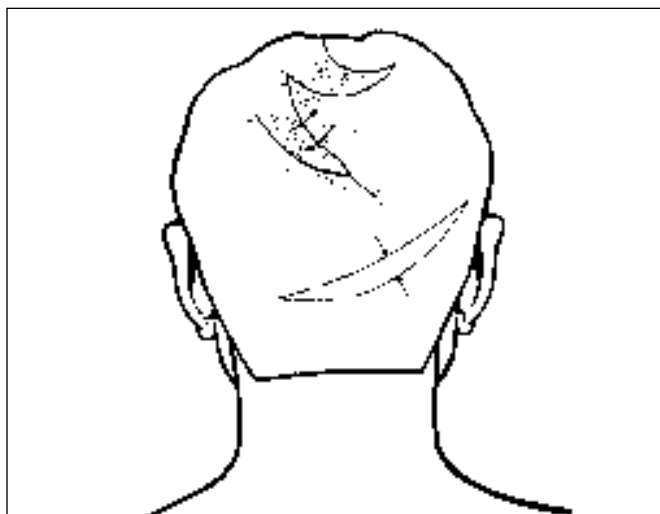


Figure 8d. Schematic demonstrating the preoperative markings for a second flap procedure underneath the first superior flap and the donor harvest immediately above the first donor harvest. Once again, the arrows indicate

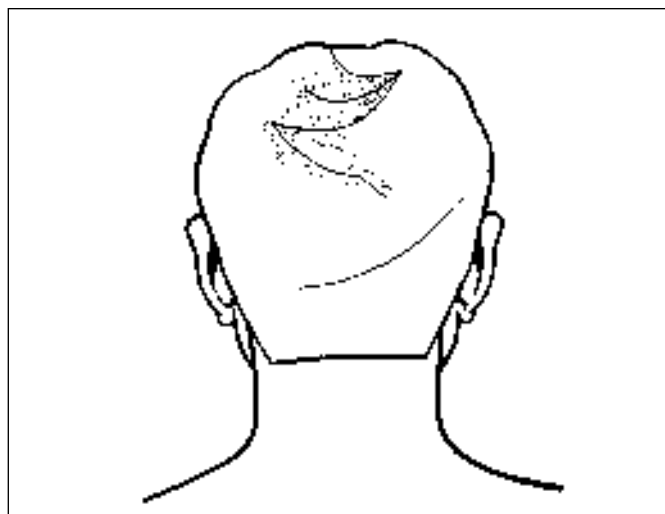


Figure 8e. The flaps are transposed in a Z-plasty fashion and sutured below the first superior flap. The donor harvest is likewise sutured after the previous donor scar is excised.

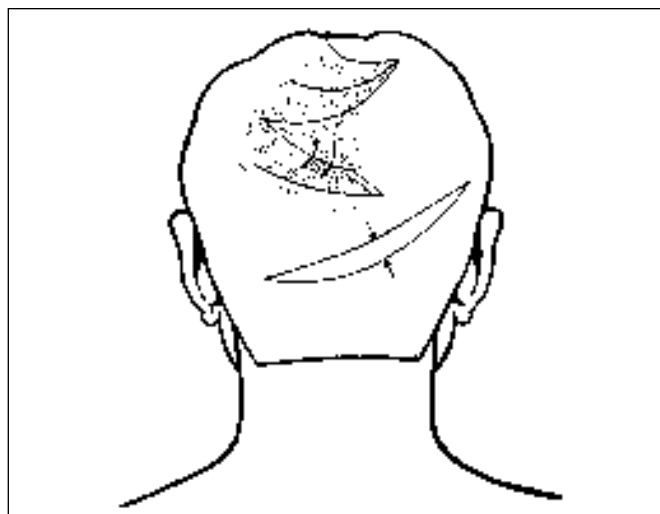


Figure 8f. Schematic demonstrating the preoperative markings for a third flap procedure underneath the second superior flap and the donor harvest immediately above the scar from the second donor harvest. Once again, the

Initially, the flap that will eventually be the superior one is formed by making the appropriate incisions. After undermining, a transverse superior incision is made where this flap will be transposed. These initial incisions must be made in such a way that hair will grow through the superior scar (Fig. 9). A large inferior flap is now created by this second incision and it is widely undermined, as is the area lateral to where the superior transposition flap was taken. It is in this latter area (opposite the superior flap) that most of the scalp laxity will be depleted. The opposite side, however, will retain much of its innate laxity. It is also critical to note, that if the scalp laxity is very poor, the inferior slot scar is not excised during this manipulation.

Conversely, if the laxity is good, the scar is excised at this time.

Once the undermining is completed, an important 0-PDS II suture is placed galeally from the superior transverse incision to the most lateral incision from where the superior flap came. This suture is critical because it takes all tension off the base of the superior flap and the distal tip of the larger inferior flap. After this suture is tied, the flaps are transposed into their appropriate positions and are sutured with 4-0 PDS II galeally and 5-0 PDS II cutaneously (Fig. 8c). Upon completion of suturing, the laxity below the Z-plasty is evaluated for its donor harvesting capability. As mentioned previously, the side opposite from where the smaller superior flap was taken will not have its scalp laxity

depleted and will yield more than enough donor tissue for hair transplantation (Fig. 8b). Normally, the superior incision of the elliptical donor harvest is first made. The superior edge of this incision is then pulled inferiorly, a bloodstain marking made, and the inferior incision made at the blood imprint.

Once the donor harvest is complete, the area is sutured (Fig. 8c), and the appropriate grafts are placed into the anterior scar line and frontal area. After all grafts are securely in place, a circumferential dressing is placed and removed the following day.

Step 2

Because one transposition flap does not give adequate coverage for deep slot formation, it is usually necessary to

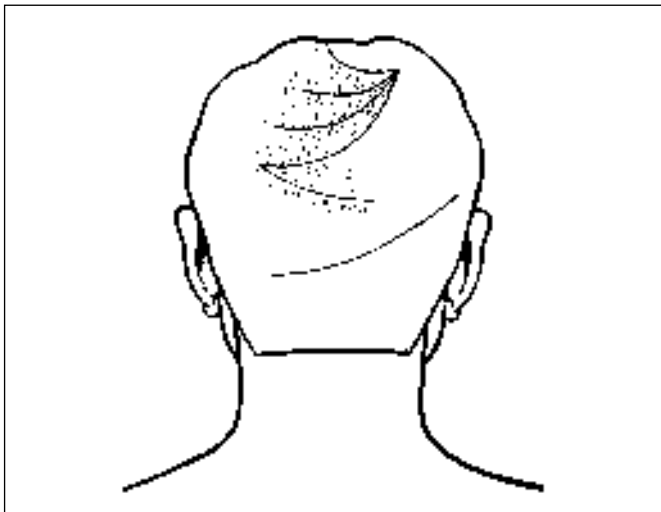


Figure 8g. The flaps are transposed in a Z-plasty fashion and sutured below the second superior flap. The donor harvest is likewise sutured after the previous donor scar is excised.

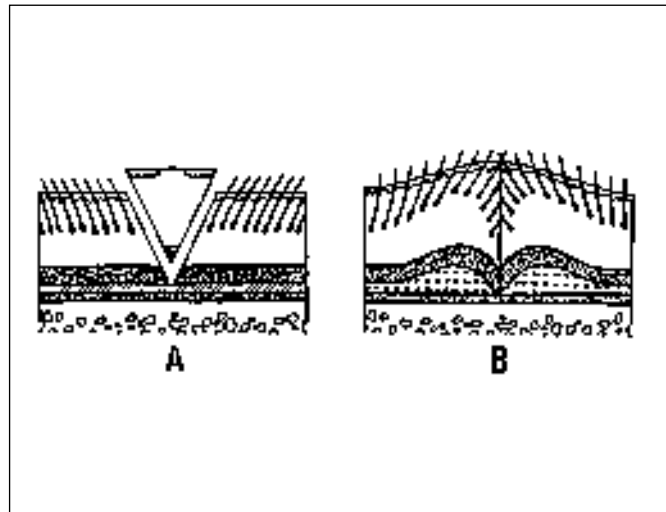


Figure 9. The initial incisions must be beveled in such a way that hair grows through the superior-most scar.



Figure 10a. A patient who had prior Y-pattern scalp reduction.



Figure 10b. A slot developed after closure with alopecia reduction. Immediately before first double procedure.

perform a second flap immediately below the first flap four months after the previous operation. This procedure is carried out exactly as the first procedure with the only exception being that the second flap is slightly longer (5 cm versus 4 cm) than the first (Figs. 8d, 8e). The scar from the first donor harvest is excised.

Step 3

This step is not usually necessary, but it may be essential four months later to place a third flap immediately below the second flap. This final flap would, of course, be required to be longer than both the first and second flaps (6 cm versus 5 or 4 cm) (Fig. 8f, 8g). Again, the scar from the previous donor harvest is excised so that one scar remains.

COMMENTS

Using single transposition flaps spaced three to four months apart in combination with hair-grafting has provided an aesthetically pleasing, expedient, and safe method for managing slot formation, while simultaneously giving the surgeon a chance to perform hair-grafting to the remaining scar and frontal area (Figs. 10-12). Additionally, the harvesting technique utilized allows only one scar to remain after multiple procedures (Fig. 13).

From a safety point of view, there has not been even the slightest hint of necrosis with this technique. This differs from the double and triple flap procedure, which frequently resulted in necrosis in the author's hands. The

occurrences that the author experienced were due to the anatomic fact that the inferior scar from the previous scalp reduction completely traversed the base of the third, most inferior flap.

Another advantage of this technique is that the second and third procedures come from areas that are far away from the initial midline scar. This reality makes the probability very high that the hair in the second and third flaps (if the third flap is needed) is permanent donor dominant hair. This is in contrast to the triple transposition flap technique, which has its most superior two flaps taken from areas adjacent to the scarline. These areas, immediately adjacent to the scar, have a much higher chance of undergoing future hair loss.



Figure 10c. After a double Frechet transposition procedure and immediately before a second double procedure. Note the increased length of the second flap.

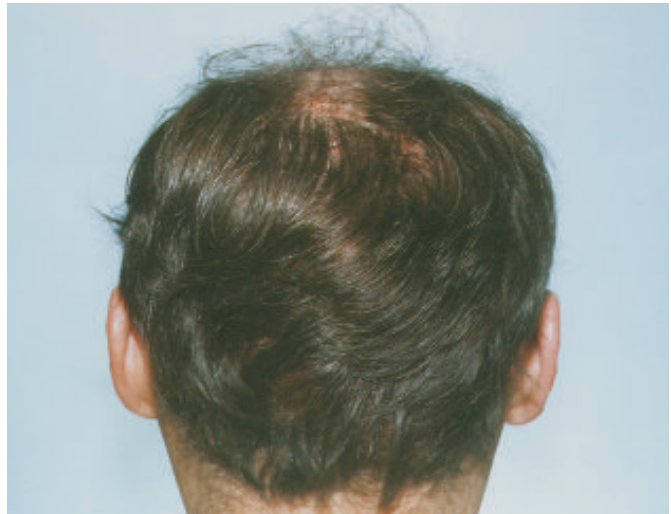


Figure 10d. After two double Frechet transposition procedures. Much better cosmesis is present.



Figure 11a. Patient with a developing type 6 baldness preoperatively immediately before a bilateral occipitoparietal scalp-lift.



Figure 11b. Upon closure, a slot developed. Immediately before a double transposition procedure with hair transplantation.



Figure 11c. Same patient after one procedure from a distance. Some inferior thinning is still noticed.



Figure 11d. Same patient after two procedures from a distance. All inferior thinning is concealed and more properly directed hair is present posteriorly.



Figure 11e. On close inspection after one procedure, scar tissue below the flap is still evident but moved laterally.

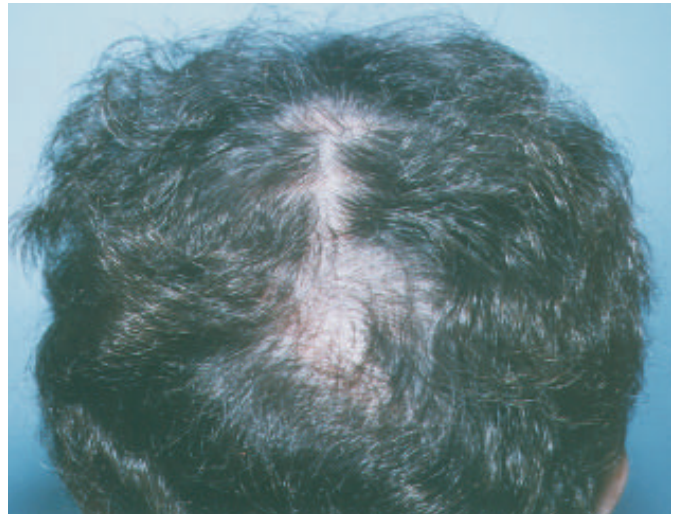


Figure 11f. On close inspection after two procedures, the inferior scar tissue is less evident and moved even further laterally.



Figure 12a. Patient with baldness preoperatively.



Figure 12b. After scalp-lifting, a slot developed. Immediately before a double transpositional procedure with hair transplantation.



Figure 12c. After two procedures.



Figure 13. After three procedures, one scar remains in the donor area utilizing the technique presented in this article.

Finally, the single transposition procedure is much easier to perform than is the double and triple flap techniques. Because there are far less variables, it is a procedure that almost all hair replacement surgeons of all backgrounds can learn to do effectively and quickly.

SUMMARY

A method for performing consecutive, single transposition flaps, in combination with hair transplantation, has been presented. This method offers the following advantages over using a one-stage triple transposition flap procedure:

1. No necrosis.
2. Simpler to perform.

3. Hair transplantation can be performed simultaneously.
4. The chances are much higher that most of the hair will be permanent in the flaps. **STI**

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