



A preliminary report on a strategy for treatment of male pattern baldness: bilateral vertical flaps plus tissue expansion

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SUMMARY. A strategy of surgical treatment for male pattern baldness has been conceived using a combination of flaps and tissue expansion. This strategy has been tested on ten cases and the results presented herein. Based on the early experience guidelines have been formulated which allow reliability and predictability of results, as well as selection of appropriate patients.

This paper describes a surgical strategy for management of male pattern alopecia. It has been designed to fulfil the following criteria:

1. A mature frontal hairline design that remains appropriate through to old age.
2. Normal density, quality and direction of hair in the priority area framing the face.
3. Hair redistribution such that further thinning due to age occurs in the vertex and upper occipital area and not in the area of the frontal hairline.
4. The ability to perform the above with safety and in the minimum time frame.

5. The ability to perform further hair redistribution surgery in response to the patient's longitudinal baldness pattern.

Method

A two set series of operative procedures was conceived, using scalp expansion and superiorly based post auricular flaps modified from Nataf¹ (Fig. 1). In the first procedure of the first set, bilateral flaps are raised

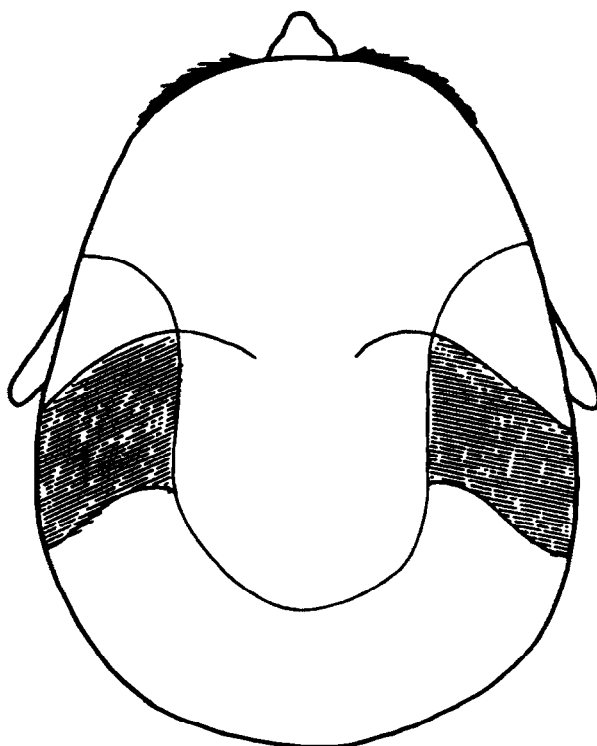


Fig. 1

Figure 1—Superiorly based postauricular flap (after Nataf) as seen from above. The expander is placed under the occipital scalp mid-way between the flaps.

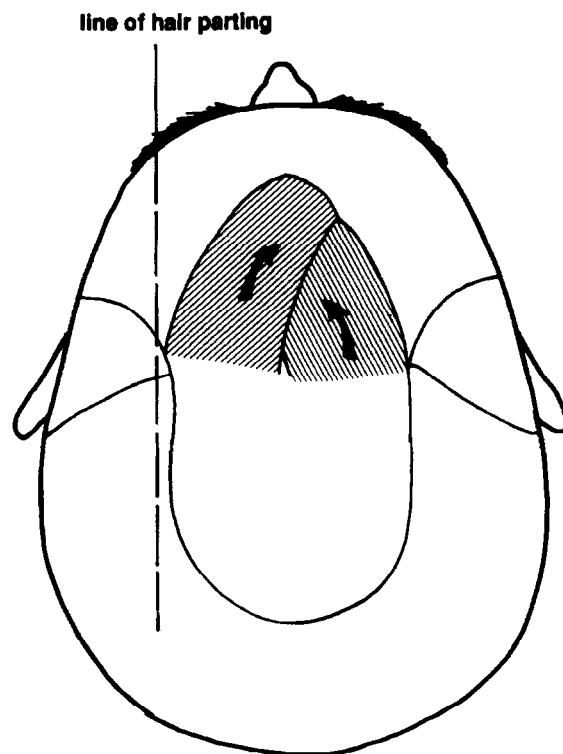


Fig. 2

Figure 2—Second operation of first set. Flaps transposed and secondary defects closed after expander removal. The entire frontal "wedge" is reconstructed with full density hair. The flap on the side of proposed hair parting is given dominance. Arrows show the direction of hair growth.

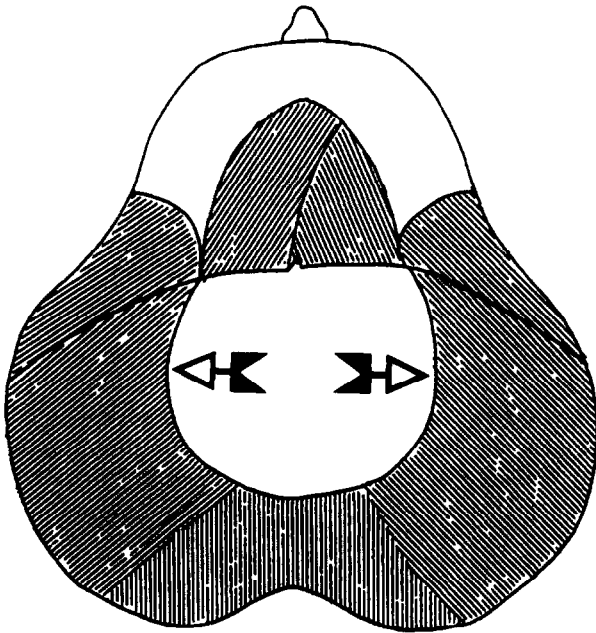


Fig. 3

Figure 3—Completion of expansion in second set. Arrows indicate line of incision placed at the edge of full density hair bearing scalp.

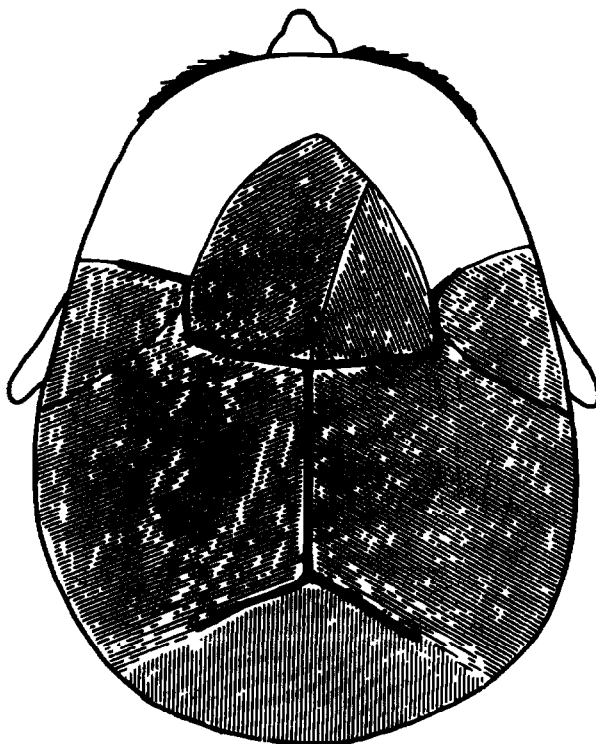


Fig. 4

Figure 4—Situation at completion of second operation of second set. Dark lines indicate surgical scars.

and a tissue expander is placed under the intervening occipital scalp. This is done in hospital under general anaesthetic. Subsequent inflation of the expander increases the width of each flap as well as providing expanded occipital scalp which, in turn, allows tension free closure of the secondary defects, following flap

transposition (Fig. 2). The latter is the second procedure of the first set and is carried out under general anaesthetic.

Two weeks later the significant central dog ears are trimmed off under local anaesthetic. Six months is allowed to elapse for maturation of scars and then, if appropriate, a second set of procedures is offered if baldness exists in the vertex and upper occipital areas.

The second set is based on the technique described by Adson² and is a two stage procedure, with each procedure being done in hospital under general anaesthetic. In the first, an expander is placed on each side under the lateral and posterior hair bearing scalp. Following successful expansion (Fig. 3), the expanded hair bearing flaps are advanced into the area behind the newly formed frontal hair wedge (Fig. 4).

Planning principles

As experience has been gained with this strategy, several points on the flap and hairline design have been found to be important and will be presented in more detail. The distance between the base of each post-auricular flap should be 10 cm and should be centred around the midline (Fig. 5). This provides for safety of blood supply, predictability of expansion and correct aesthetics for the future frontal hairline.

The anterior margin of the superior end of the flap is placed on a line which is called the preauricular line. This is described by tracing a line vertically upward from the tragus of the ear at ninety degrees to the Frankfort horizontal (a line from the inferior orbital rim to the tragus of the ear) (Fig. 6). The preauricular line then meets its fellow from the opposite side.

A further planning line is marked from the centre of the preauricular line to the level of the eyebrow. Bisecting this line gives the locus for the most anterior central point of the frontal hairline (Fig. 5). The presence of residual hair on the frontal hairline should be noted and may call for some modification of the above plan.

The flap is designed with a mid width of 3.5 cm and an overall length of 10 to 12 cm. The inferior extent of

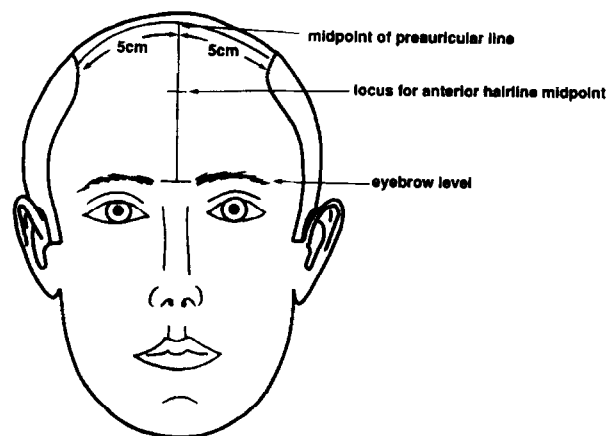


Fig. 5

Figure 5—Presurgical planning lines, anterior aspect.

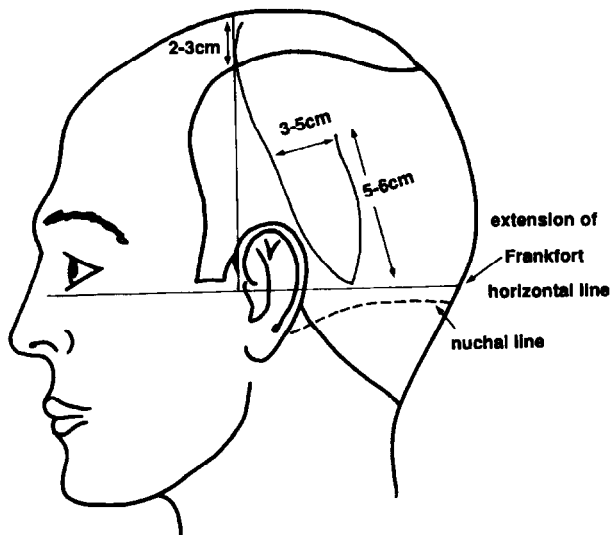


Fig. 6

Figure 6—Presurgical planning lines, lateral aspect. The vertical preauricular line can be easily determined and marked on the patient. This allows ready selection of suitable candidates for this strategy as well as accurate flap design in suitable patients.

the flap must not transgress the nuchal line, nor should the dissection for placement of the tissue expander. This allows preservation of the occipital artery, which becomes the main vessel supplying the posterior scalp and bilateral flaps once the flaps are raised. Furthermore, the hair below the nuchal line tends to be coarse and curly, while expansion is difficult because of

its adherence to muscle. The nuchal line is easily delineated as a posterior extension of the Frankfort horizontal line (Fig. 6).

The most useful expander has been found to be a 680 ml rectangular model manufactured by Cox-Uphoff (USA).

Technique

At the first operation of the first set, the flaps are raised incompletely, as shown in Figure 6. The expander is located centrally under the occipital scalp and then the flaps are sutured back into their original position. This provides a delay, allowing readjustment of the blood supply to the inferior half of each flap. After a 2 week period, for healing, expansion is commenced at a rate of 100 ml per week until complete.

At the second operation of the first set, flaps are raised as before, but in addition, the posterior border of each flap is extended upwards to give a flap base width of 5 cm and overall flap length of 12 cm. The flap on the side of the proposed parting (usually the left) will be located on the previously described frontal hairline such that it crosses the midline a distance equivalent to the width of the flap. The tip is then cut off and discarded. In this way the entire "frontal wedge" anterior to the preauricular line is filled with hair with directional dominance forward and away from the part, allowing easy styling. The junction between the flaps is away from the midline and well hidden by the natural fall of hair (Fig. 2).



Fig. 7

Figure 7 (A) Frontal view of suitable candidate. (B) Vertex view. Width of alopecia at the preauricular line was 10 cm. (C) Frontal view after completion of second set of procedures. Full density hair frames the face. (D) Vertex view. Full reconstruction achieved. Scarring is minimal.

If the second set of procedures is required, two 500 ml expanders are placed one on each side under the lateral and posterior scalp, ensuring they are located just above the nuchal line for the reasons previously mentioned (Figs 3, 4). It may not be possible to remove the total area of vertex alopecia using the second set of procedures. If a central area of alopecia remains, it may be covered by hair styling.

Results and complications

At the present stage of this study, 10 patients have completed first set procedures, while 4 of those have had second set procedures. Hence this is a preliminary report.



Fig. 8

Figure 8 (A) Borderline candidate. Width of alopecia at the preauricular line was 12 cm. (B) Frontal view following completion of second set of procedures. Good density of hair framing the face. (C) Vertex view following completion of second set of procedures. Alopecia persists in the central vertex/occipital areas.

The above planning principles were formulated from experience gained with the first 4 cases. In the latter 6 cases there have been no complications in what has become a routine procedure. In the first group there was 1 case of partial flap necrosis which occurred as a result of the flap transgressing the nuchal line. This resulted in division of the occipital artery as well as inadequate expansion inferiorly, leading to vascular compromise.

This experience led to the use of the nuchal line in planning the limits of flap length.

The early experience also highlighted the need to mark the proposed frontal hairline indelibly immediately prior to the second procedure of the first set. Failure to do this resulted in poor placement in 2 of the first 4 cases.

The average time off work to completion of the first set of procedures was approximately three weeks. Neither work nor social activity were compromised once the dog ears were trimmed and patients did not need to camouflage the scalp subsequent to that event.

Typical results are shown in Figures 7 and 8.

Discussion

This paper is a preliminary report on a strategy devised to deal with the common condition of male pattern baldness. It must be compared and contrasted with other surgical strategies devised to deal with the same problem. Essentially these fall into two groups:

1. The use of grafting techniques for frontal hair reconstruction with or without scalp reductions posteriorly.^{2,3}
2. The use of flap techniques for frontal hair reconstruction with or without scalp reductions posteriorly.⁴⁻⁶

Variations occur and in some centres the entire problem is dealt with by grafting alone.⁷ However, there are well recognised disadvantages when grafting is used for frontal hair reconstruction. Sufficient vascular scalp must surround each graft to allow vascularisation and graft survival. This means that a normal density of hair cannot be immediately achieved and it may take many sessions to come even near to such a result. During this period the frontal hairline has an artificial appearance, requiring the patient to camouflage the area with a hair piece or hat and may compromise his work and social life unacceptably. With the technique outlined in this paper there is immediate reconstruction of the preauricular wedge, naturally framing the face with full density hair.

Dardour⁸ has recently described a strategy of dealing with various patterns of baldness using local flaps to reconstruct the frontal hairline and scalp reduction for more posterior alopecia. He describes various strategies which, in some cases, have the advantage of requiring only a single surgical procedure. However, this approach demands good scalp elasticity to close flap donor sites and to achieve sufficient scalp reduction. In addition there is a risk of "stretch back", as the donor site will be closed under some tension despite extensive undermining. Some

patients may have poor elasticity and risk alopecia developing adjacent to suture lines.

I have found that tissue expansion carried out prior to flap transposition allows tension free closure of the flap donor site using expanded posterior scalp. The use of expanders also allows a broader flap to be raised (4 to 5 cm) and virtually total reconstruction of the preauricular wedge with hair bearing scalp.

If scalp reduction is required posterior to the preauricular wedge reconstruction, the use of expanders allows maximum upward advancement, even in cases of poor scalp elasticity.

Using the flap designs as described will produce normal density and quality of hair in the frontal hairline while a simultaneous tissue expansion allows closure with posterior scalp, avoiding any compromise to the temple hairline. Thus the hair framing the face is full density with correct direction which satisfies, in part, the criteria proposed in the introduction.

Any strategy designed to deal with male pattern baldness must allow for further progression of the condition. This will usually manifest itself by hair loss and thinning from the vertex and occiput downwards and forwards. Once the first set and, if necessary, the second set of procedures is performed it can be seen that, while further progression of baldness will occur in this natural way, the important "face framing" frontal area will be spared. Should such progression be significant and should the remaining scalp have sufficient hair density, then a further set of procedures can be performed similar to the second set.

There has been no patient request for micro-grafts to the frontal hairline scar, as these scars seem to defy detection except to the closest scrutiny. However, revision of donor site scars has been carried out in 2 cases.

It can be seen from the planning principles that not all cases will be suitable for this technique. Contra-

indications include cases where the width of alopecia along the preauricular line exceeds 10–12 cm and where there are surgical scars across the base of the flaps or the base of the occipital scalp. In such patients grafting techniques^{3,7} may provide the best solution.

References

1. Nataf J. Surgical treatment for frontal baldness: the long temporal vertical flap. *Plast Reconstr Surg* 1984; 74: 628–35.
2. Adson M, Anderson R, Argenta L. Scalp expansion in the treatment of male pattern baldness. *Plast Reconstr Surg* 1987; 79: 906–14.
3. Norwood OT, Shiell RC, eds. Organisation and planning procedure: micrografts and minigrafts. In: *Hair Transplant Surgery*. 2nd ed. Springfield, Illinois: Charles C. Thomas. 1984: 45–156.
4. Blanchard DG, Blanchard B. Obliteration of alopecia by hairlifting: a new concept and technique. *J Am Med Assoc* 1977; 69: 639–41.
5. Juri J. Use of parieto-occipital flaps in the surgical treatment of baldness. *Plast Reconstr Surg* 1975; 55: 456–60.
6. Ohmori K. Microsurgical free temporo-parietal flaps in surgery for male pattern baldness. *Clin Plast Surg* 1991; 18: 791–6.
7. Uebel C. Micrografts and minigrafts: a new approach for baldness surgery. *Ann Plast Surg* 1991; 27: 476–87.
8. Dardour JC. Treatment of male pattern baldness and post-operative temporal baldness in men. *Clin Plast Surg* 1991; 18: 775–90.

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