

was not supported by the microscopic findings in the present cases and, furthermore, in 2 of the patients the localization was in non-sun-exposed areas.

These 4 patients were seen over a 4-month-period, which may indicate that this disease simulating malignant lesions is not really so uncommon.

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Synchronous Balding of Scalp and Hair-bearing Grafts of Scalp Transplanted to the Skin of the Arm in Male Pattern Baldness

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Abstract. The author transplanted composite skin grafts from balding, non-balding, and bald areas of the scalp, to the skin of the arm. The galea aponeurotica was trimmed away from the grafts. The patient was a 29-year-old male with progressive male pattern baldness (MPB).

The transplants from the balding area became bald at the same rate as the balding donor site in the receding frontal hairline, whereas the transplants taken from the non-balding area in the occiput continued to grow the same amount and quality of terminal hairs. Bald grafts taken in front of the receding hairline remained bald. This shows that the cause of MPB lies in the follicle itself or in

its very close surrounding and does not depend on the galea aponeurotica, the increased tension of the scalp or of its muscles, the diminished vascular supply to the scalp or any other regional factor localized to the head area. It also shows that the "balding clock" keeps time even when the follicle is transplanted to another region of the body.

Key words: Male pattern baldness; Galea aponeurotica; Alopecia; Hair transplantation

During the last few decades, several hypotheses concerning the etiology of male pattern baldness (MPB) have been presented. In 1933, Wadel (10) reported findings of decreased motility of the scalp. He was convinced that this decrease was due to the fact that in MPB patients the scalp is both frontally and sagittally too short, and thus it has to be stretched like a too-small cap to cover the relatively too-big skull. For hair nutrition and rooting this persisting tension creates unbearable conditions, leading to gradual loss of hair. In 1935 (11) he wrote that MPB is the end result of the tension atrophy of the scalp covering the galea aponeurotica. This atrophy is caused by a disproportion between the skull bone and the galea aponeurotica, due to an isolated growth of the skull bone to which the tendon-like structure of the galea is not able to adapt. He reported excellent results in the treatment of MPB with "loosening" massage to the scalp.

In 1941, Kessler (2) started experimental work with frontal galeotomies in order to reduce the supposed increased tension of the galea aponeurotica. In 1961 he reported (3) a success rate of 87% with this treatment of MPB. At that time this operation was popular in Europe. In 1963, Pontén (8) reported that after frontal galeotomy he could not find any objective improvement in his 56 patients and he still holds this view concerning this operation (personal communication, 1976).

The present author has seen several patients who have undergone frontal galeotomy and later developed an advanced degree of MPB. The popularity of this operation has waned.

A still-popular idea concerning the etiology of MPB is the decreased vascular supply to the scalp (5, 10). Dorsey (1) considered this to be due to the trauma produced by tightly fitting hats to the temporal artery and vein.

Szasz & Robertson (9) suggested that the increased tension of the scalp muscles is the cause of MPB.

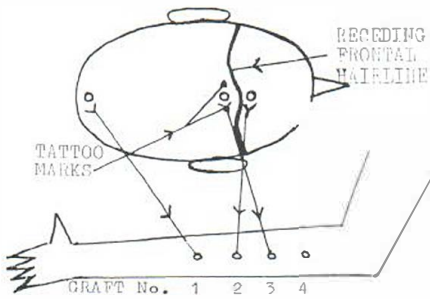


Fig. 1. Transplantation of composite skin grafts.

In 1959, Orentreich (7) published results of continuing hair growth in his hair-bearing grafts transplanted from the non-balding occipital region to the bald areas of the scalp. Regarding the treatment of MPB, this investigation resulted in the present extensive use of punch hair grafting. In this method the galea aponeurotica is excised from the recipient hole. Thus the milieu for the new transplanted follicles is not the same as for those which became bald (4).

The author made the following experiment to settle the role of the following factors in the development of MPB:

- the galea aponeurotica
- the supposed increased tension of the scalp
- the supposed increased tension of the scalp muscles
- the supposed decreased vascular supply to the scalp
- other factors that follow from the localization of the follicles to the head.

MATERIAL AND METHODS

Hair transplantation with the punch graft method was performed on a 29-year-old male with a receding hairline due to progressive MPB. 1 cm behind the receding hairline, two tattoo marks were placed and between these a 4-mm diameter hair-bearing composite punch skin graft with subdermal fat and hair follicles was taken following the procedure described by the author (6). In the same way, two additional grafts were taken; one 1 cm in front of the receding hairline (which since his 20th year of life had already receded about 4 cm), and one from the occipital region, unaffected by MPB. The galea aponeurotica and excess fat under the follicles were trimmed away. These grafts were transplanted to the forearm (Fig. 1). As control, a similar graft of the skin of the forearm was transplanted as the 4th graft to the row of the three grafts mentioned above.

The skin in the recipient site was thinner than that in the transplants. The grafts were fixed with microporous tape for 8 days postoperatively.

RESULTS

The hairs in the hair-bearing grafts gradually fell off over a couple of weeks and started to grow again after about 3 months as is normally seen in punch hair grafting.

5, 10 and 21 months after transplantation the numbers of hairs in the transplants were counted. The grafts were then excised for histological examination. In the graft taken from the occipital region the number and macroscopical quality of the hairs remained unchanged, whereas in the graft taken from between the tattoo marks placed 1 cm behind the receding hairline, the number of hairs diminished rapidly and the hairs grew macroscopically much thinner. The hair at the level of the tattoo marks in the receding hairline became much more sparse and the distance to the hairline had diminished to about 2 mm. The graft from the denuded area and the control graft from the forearm remained bald (Table I).

DISCUSSION

In the receding hairline and in the graft taken from it the loss of hairs remains synchronous even though the latter is transplanted to a remote skin area. In MPB the "balding clock" in the follicle or in its very close surrounding keeps time even when the follicle is transplanted to the skin of the forearm. The presence or absence of the galea aponeurotica does not influence the balding process in MPB. Nor does any supposed increased tension of the scalp or its muscles or a diminished vascular supply to the scalp have an effect on balding. Neither do any other factors localized to the head cause balding. The cause seems to lie in the follicle

Table 1. Number of hairs in each transplant

Graft number . . .	1	2	3	4
5 months after transplantation	13	0	12	0
10 months after transplantation	13	0	10	0
21 months after transplantation	14	0	4	0

itself or its very close surrounding. The graft taken from the denuded area did not grow new hairs, and so the MPB process of the hair follicle is not reversed by a change in its location on the human body.

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Liver Biopsy in PUVA-treated Patients

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Abstract. Seventy-five liver biopsies were performed in 30 psoriatics and 5 patients with mycosis fungoides undergoing treatment with photochemotherapy with 8-methoxypsoralen and UVA light. All patients had pre- and post-

PUVA biopsies, the latter after one year. Five psoriatics had a further biopsy after 2½ years of treatment. No statistically significant differences were found between biopsies taken before and after treatment.

Key words: Photochemotherapy; 8-methoxypsoralen; Liver biopsy

Within recent years, PUVA, i.e. photochemotherapy with psoralens and subsequent exposure to long-wave ultraviolet light (UVA), has become an alternative to methotrexate for the treatment of severe psoriasis. One of the main reasons for preferring PUVA has been methotrexate's well-known liver toxicity (1, 3, 10). Psoralens in double-blind acute toxicity studies on human volunteers (6) seem to have disproved early concern about hepatotoxicity (2). Present clinical experience (4, 8) is generally in accordance with the experimental studies. However, occasional transient elevation of serum transaminases has been reported (5, 7), and as no long-term clinical studies including liver biopsies have hitherto been published, we found it reasonable to add liver biopsies to the control of patients on PUVA. The present paper reports on results of biopsies made on 35 patients treated from 1 to 2½ years with PUVA.

MATERIAL AND METHOD

Our investigations were carried out on 75 liver biopsies from 30 psoriatics and 5 patients with mycosis fungoides. All had a pre-PUVA biopsy taken, and a further one after 1 year's treatment. 5 psoriatics also had a third biopsy taken, 1½ years later. PUVA was administered according to generally established treatment schedules with 8-Methoxypsoralen (Meladinine®) administered 2 hours prior to ultraviolet light. Initially most patients received treatment 3 to 4 times a week with a reduction in frequency following clinical improvement. The normal dosage per treatment varied from 30 to 60 mg according to body weight. The average methoxalen dosage after one year was 2480 mg, varying between 1000 and 9200 mg.

All biopsies were obtained by the Menghini technique using a 70×1.9 mm needle. Sections were cut 5 µm thin and stained with haematoxylin-eosin and van Gieson. Fatty infiltration, nuclear variability, periportal inflammation, focal necrosis, cholestasis, fibrosis and cirrhosis were estimated. Except for cirrhosis, each histological abnormality was graded as 1 (not present), 2 (slight), 3 (moderate) or 4 (severe). Cirrhosis was interpreted as either present or absent. The grading was performed by one of us without knowledge of the clinical data.

All patients were asked to supply information upon their alcohol consumption. No restriction of alcohol intake was required. It is not unlikely, however, that a certain reduction in alcohol intake may have taken place between the