Autologous Suction Blister Grafting for the Treatment of Vitiligo

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Background: **There are many therapeutic options for vitiligo such as phototherapy, steroids, transplantation of blister tops or minigrafts, and the application of cultured melanocytes.**

Objective: **The purpose of this study was to evaluate the effectiveness of autologous suction blister grafting for the treatment of vitiligo.**

Method: **Blisters were made by suction at 450 mm Hg from the buttock or upper thigh as donor sites. The epidermal sheet was then grafted to the recipient site. Two weeks after grafting, topical PUVA, or topical corticosteroid application were recommanded.**

Results: **The restoration of pigment including partial recovery was seen in 130 of 144 patients with vitiligo; grade 0 in 14 patinets(10%); grade 1 in 21(36%); grade 2 in 22(27%); grade 3 in 28(27%). In type B vitiligo, repigmentation was seen in 71 of the 74 patients; grade 0 in 3 patinets; grade 1 in 21; grade 2 in 22; grade 3 in 28. However, repigment in type A was seen in 58 of the 70 patients; grade 0 in 11 patients; grade 1 in 33; grade 2 in 16; grade 3 in 10. The repigmentation rate was related to age in both type A and B. The rate was higher in the "less than 31-year-old" group than in the "over 31-years-old" group. ($p<0.01$, Mann-Whitney test).**

Conclusion: **The author experienced different repigmentation according to the types of vitiligo and patient age, that is,it was more effective in type B vitiligo than type A, and the younger the age of the patient, the better the results. (Ann Dermatol 8:(1) 19~24, 1996).**

Key Words : Autologous Suction Blister Grafting, Vitiligo.

Vitiligo is a pigmentary cutaneous disorder characterized by well-circumscribed white patches devoid of identifiable melanocytes. Although there are three prevailing theories explaining vitiligo, such as the neural hypothesis, the self-destruct hypothesis, and immune hypothesis,its pathogenesis is still unclear. Many medical therapies,[1] such as PUVA, corticosteroids, melagenina etc, take a long time and are occasionally ineffective. For this reason, surgical approaches, such as the transplantation of blister tops[2-7] or minigrafts[8] from normal pigmented areas, and the application of autologous epidermal sheets[9,10] or collagen-backed cultured melanocytes[11], should be considered when medical therapies fail.

Previous studies[2-7] have shown the usefulness of autologous grafts carrying melanocytes for the treatment of vitiligo. This study describes the results in 144 cases of vitiligo using the treatment of autologous suction blister grafting(ASBG). The results indicate that ASBG might provide an effective alternative for treating vitiligo.

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MATERIALS AND METHODS

Subjects

A total of 144 patients with vitiligo was treated with ASBG during the period from Februay 1991 to November 1994. The subjects were divided clinically

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Table 1. A file of the subjects according to type of vitiligo

	Type A	Type B	Total
Patients	70	74	144
Sex (M/F)	30/40	33/41	66/81
Age (Mean SD)	28.4 ± 13.6	22.4 ± 9.8	25.3 ± 12.1
Duration (years)	9.5 ± 9.2	5.6 ± 4.7	7.5 ± 7.4
Family History	7 (10%)	7 (9.5%)	14/144

Table 2. Age distribution of the subjects

	Type A	Type B
- 10	3	5
11 - 20	24	28
21 - 30	18	28
31 - 40	11	8
41 -	14	4
Mean SD	28.4 ± 13.6	22.4 ± 9.8
Total	70	74

Table 3. Description of grading scales for the evaluation of the effectiveness of autologous suction blister grafting

Grade	Description of results from the operation
0	No response
1	Repigmentation at the transplanted site only
2	Expansion of the repigmented area beyond the graft sites
3	Almost complete repigmentation of vitiliginous area

Table 4. Degree of repigmentation according to age

	Type A		Type B		Total (TypeA + B)	
Age (yr)	≤30*	>30*	≤30⁺	>30⁺	≤30**	>30**
Results						
Grade 0	5	6	1	2	11	3
Grade 1	18	15	15	6	33	21
Grade 2	14	2	18	4	16	22
Grade 3	8	2	28	0	10	28
Total	45	25	62	12	70	74

*, ⁺, **; $p<0.01$, Mann-Whitney test. yr(years).

into two groups according to the distribution of the lesions by a modified Koga's classification[12]; type A, symmetrical distributed common type, and type B, unilateral, dermatomal or localized distribution. Seventy out of the 144 patients were type A, and 74 were type B, with the mean age and standard deviation of patients of 25.3 ± 12.1 years, and with age distribution of 9 to 56 years(Table 1, 2). The duration of the disease was from 1 to 35 years. All patients selected revealed no history of developing new lesions during the previous year. The follow-up period ranged from 6 months to 3 years.

Autologus Suction Blister Grafting

Epidermal grafting was performed, as previously described[2-6]. Briefly, two days before grafting, blisters at the recipient site were made by the application of liquid nitrogen. Blisters were made by suction from the buttock or upper thigh as donor sites, the area of which were separated from the vitiliginous areas by at least 20 cm or more. To obtain the rapid blistering on the donor site, the skin was warmed by an incandescent electric lamp with caution against burning. After approximately the one to one and a half hours of suction at 450 mm Hg, a large bulla was formed. After removal of the roof of the blister at the recipient sites, the roof of the

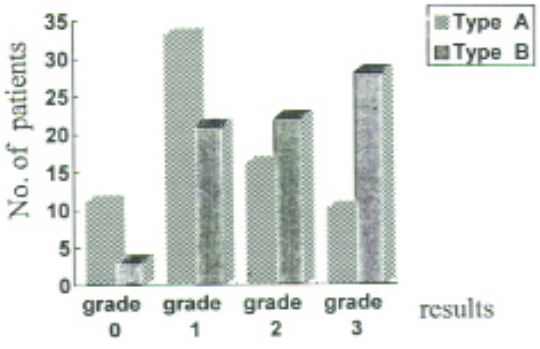

Fig.1. Degree of repigmentation according to type of vitiligo.

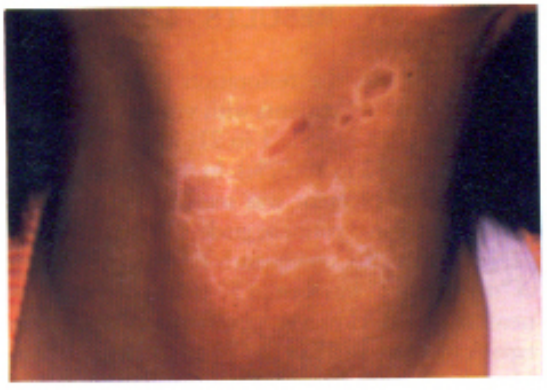

Fig. 2. Grade 1, central repigmentation and marginal hypopigmented rim.

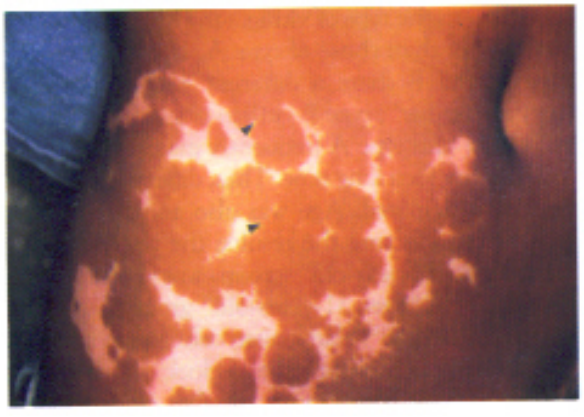

Fig. 3. Grade 2, expansion of the pigment beyond the graft sites, as a result of the pigment spreading(arrow head).

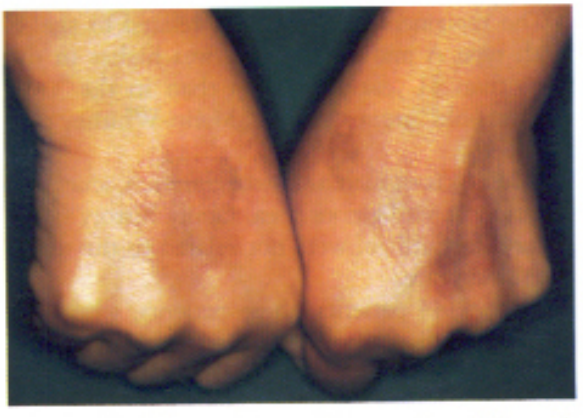

Fig. 4. Grade 3, complete repigmentation of the graft sites(type A vitiligo).

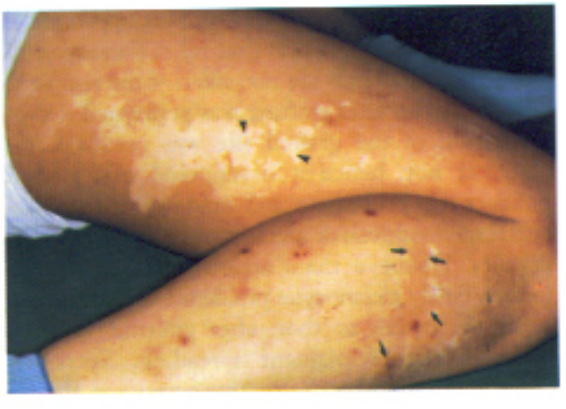

Fig. 5. The 20-year-old woman patient who was type A vitiligo. Nearly complete repigmentation(arrow) was achieved and remained unchanged. However, one and a half year after ASBG, new white patches(arrow head) occurred on the thigh.

suction blister was carefully dissected, and the epidermal sheet was grafted to the recipient site. Two weeks after grafting, topical PUVA, or topical corticosteroid application were recommanded.

Evaluation of the results of the grafting

For the evaluation of the effectiveness of the grafting, I arbitrurily classified the results of ASBG as grading scale 0, 1, 2, and 3(Table 3, Fig. 2, 3,4). Usually the results were judged at 6 months after the operation.

Statistics

The Mann-Whitney test was used for data evaluation of the results.

RESULTS

On the whole, the restoration of pigment was seen in 130 of 144 patients with vitiligo: grade 0 in 14 patinets(10%); grade 1 in 21(36%); grade 2 in 22(27%); grade 3 in 28(27%). In the type B vitiligo, restoration of pigment was seen in 71 of 74 patients: grade 0 in 3 patinets; grade 1 in 21; grade 2 in 22; grade 3 in 28. Consequently pigment restoration of "over grade 2" was seen in 50 (68%) of the 74 patients of type B. However, restoration of pigment in type A was seen in 58 of the 70 patients: grade 0 in 11 patients; grade 1 in 33; grade 2 in 16; grade 3 in 10. Therefore, pigment restoration of "over grade 2" was seen in 26 (37%) of the 70 patients of type A(Fig. 1).

The repigmentation rate was related to age in both type A and B. The rate was higher in the "less than 31-year-old" group than in the "over 31-years-old" group. ($p<0.01$, Mann-Whitney test, Table 4).

Other factors, such as disease duration, anatomic location of vitiliginous area, family history background for vitiligo, were not related to the repigmentation rate.

Of the 144 patients, three patients, who were type A vitiligo, showed depigmentation at the donor sites.

DISCUSSION

Generally, epidermal grafting is considered as one of most effective surgical methods for treating patients with vitiligo. Koga[7] reported repigmentation in 80 % of 45 patients with segmental and non-segmental vitiligo. Mutalik[12] reported total restoration of pigment seen from 48 of 50 patients with localized vitiligo. Suvanprakorn et al[6] observed partial or complete repigmentation in 28 of 30 patients with generalized and segmental vitiligo. Hatchome et al[4] reported similar results and observed Koebner phenomenon at the donor sites in 4 patients with generalized vitiligo. In the present report, the author observed similar results, that is, the repigmentation rate of operation sites was 90%.

There are many factors in determining the success of this method; the blistering methods employed[6], immobilization[5], anatomic location[6,14], type of vitiligo, disease activity, the depth of cryonecrosis of recipient site, and so on. Skouge et al[5] indicated immobilization, especially during the first 3 days, was critical for graft survival. Lontz et al[14] indicated the major factor that determined repigmentation independent of the method of transplantation was not age or disease activity but the anatomic location of the recipient site. Also, they suggested that vitiligo is a condition with a cyclic time-limited activity confined primarily to progressively depigmenting areas that, after abrasion, will sustain a healthy, autologous population of transplanted melanocytes. It was also observed in this study that one and a half years after complete repigmentation, further progression of vitiliginous lesions occurred in other areas(Fig. 5).

In the present study, the results were very different according to the type of vitiligo; the results of type B were better than those of type A. It is known that type A and B share a different pathophysiology from each other[15]; type B vitiligo is usually stable after 1 year, and type A frequently maintains its disease activity for a long time. Thus, different resuls are readily anticipated. Age was also another important factor affecting the results; the results in the "less than 31-year-old" group was better than those in the "over 31-years-old" group. I believe the Hayflick limit[16] (Mammalian cells grown in a laboratory seem to obey an internal clock, which allows them to divide a maximum munber of times) explains the results to some extent.

When donor epidermis is grafted on the recipient site, the basal layer of the grafted epidermis(rete ridge) shows an undulating shape, and the recipient dermal papillar shape is of a similar appearance. Therefore it is assumable that all melanocytes of the grafted epidermis are not taken at the recipient site. However, after grafting was performed, repigmentation of the grafted site was usually complete, or not; hence it is supposed that grafted melanocytes proliferate and migrate, or more arborize its dendrites, or are destroyed by any kind of activity. I believe there are two reasons for the former. Firstly melanocytes proliferate and migrate to a certain extent so that, after grafting, there is some degree of pigment spreading. Secondly, there is melanocytes destructive activity in the vitiliginous area, though it is not well defined. Thus, this activity interferes with the proliferation and migration of the grafted melanocytes. As a clinical clue, I experienced many cases resembling Fig. 2,

which is classified as a grade 1 result showing hypopigmented rim. Although the precise mechanism of the depigmented rim was not clear, it is the feeling of the author that some acitvity producing vitiliginous area was persisting in the white area. That view was supported by other's reports[17,18]; the marginal area showing an active pathologic finding compared with the central vitiliginous area. And more recently Olsson and Juhlin[19] suggested the lack of pigmentation at the periphery of the transplanted skin is due probably to residual activity of some melanocyte-destroying factors.

Gauthier et al[20] already posturated that "to increase the percentage of success, particularly in vitiligo, it would be advisable before grafting to perform a minigraft to test the responsiveness of the achromic area to the melanocytes". Additionally, I think the testing site of responsiveness should includ the central and peripheral area of the achromic area because the disease activity persists in the marginal area longer than in the central area.

In conclusion, considering the facts that there are no clinically easy available laboratory tests for predicting the results of this procedure, each result probably reflects the disease activity of each lesion, ie, those with no response to ASBG, high active status; those with central pigment recovery with peripheral hypopigmented rim, disease activity persisted in hypopigmented marginal area; in those cases of showing "pigmentation speading phenomenon" or "completely pigmentation recovery", inactive disease status. In addition clinical evaluations, such as no new areas of depigmentation prior to treatment, or scallopping board, were not always accurate. Therefore, it would be advisable to test the responsiveness of epidermal grafting on the centeral and peripheral area of the achromic area before performing this grafting.

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