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To Evaluate the Efficacy of Non-Cultured Epidermal Cell Suspension in Cases of Stable Vitiligo

Leelavathy B, Akshi Bansal and Shilpa K*

Department of Dermatology, Venereology and Leprosy, Bangalore Medical College and Research Institute, India

Abstract

Introduction: Vitiligo is an acquired disorder of pigmentation caused by loss of epidermal melanocytes. Surgery in vitiligo has come up a long way from tissue grafting to cellular grafting techniques which includes non-culture epidermal cell suspension.

Materials and Methods: 30 patients with vitiligo, stable for atleast 1 year were included in this study. Ultra-thin split thickness graft was harvested and incubated in Trypsin-EDTA. The suspension was centrifuged to obtain a pellet which was re-suspended and applied to derma braded recipient area.

Results: Overall, 19 (66.67%) patients showed excellent (>90%) pigmentation, 5 (16.67%) had very well (50%- 75%) repigmentation and 4 patients (13.33%) had a good response (25%-50%). Majority of patients (53.33%) had good colour match with surrounding skin. 13 patients (43.33%) complained of dyspigmentation and 1(3.33%) patient had scarring at donor site.

Conclusion: Non-cultured epidermal cell suspension is a safe and effective surgical modality in management of stable vitiligo.

Introduction

Vitiligo is an acquired, idiopathic and worldwide common depigmentation disorder affecting people of all ages and sexes equally [1]. The worldwide prevalence of vitiligo ranges from 0.5% to 1% [2].

Current conventional treatment modalities include corticosteroids, calcineurin inhibitors and phototherapy. While medical therapies are the primary treatment, they are effective in only 60%-70% of the patients [3]. In light of these limitations surgical modalities were introduced in 1964 and since then, have come up a long way from tissue grafting techniques to cellular grafts. The major advantage of cellular grafts over tissue grafts is that they permit the treatment of the affected area many folds larger than the donor area [4].

Non-cultured epidermal cell suspension is a relatively new cellular grafting technique in need of being explored further.

Materials and Methods

This was an interventional, prospective study done at Dermatology outpatient department at Victoria Hospital and Bowring and Lady Curzon Hospital attached to Bangalore Medical College and Research Institute, Bangalore during the period of November 2014 to May 2017. Ethical clearance was obtained before starting the study. A total of thirty patients with stable vitiligo, not responding to conventional treatment were included in study after obtaining written informed consent. Patients with progressive vitiligo, keloidal and bleeding tendencies were excluded. Detailed clinical, general physical, systemic and dermatological examination along with baseline investigations of complete blood count and random blood sugar were carried out in each patient prior to procedure.

Preparation of non-cultured epidermal cell suspension

Under aseptic precautions ultra-thin split-thickness graft was harvested from antero-medial aspect of thigh using Humby's knife. The graft was washed in saline, treated with trypsin solution and incubated at 37°C for 45mins. Thereafter, mixture was neutralized with saline. The contents were teased to separate epidermis from dermis. The epidermal constituents obtained were suspended in DMEM solution and centrifuged at 3500 rpm for 15 mins to obtain the pellet.

Transfer of suspension to recipient area

The recipient area was derma braded superficially using motor dermabrador. Appearance of

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Correspondence:
Leelavathy B, Department of Dermatology, Venereology and Leprosy, Bangalore Medical College and Research Institute, Karnataka, India, E-mail: drleelaskincare@rediffmail.com

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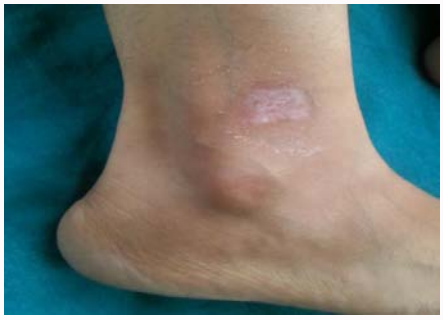

Figure 1: (A) Before Surgery.

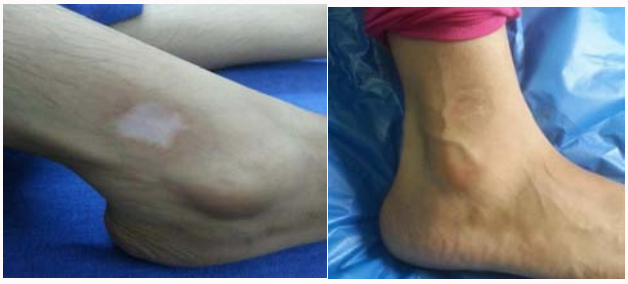

Figure 1: (B) and (C) After Surgery.

Table 1: Demographic characteristics.

Characteristics	NCECS
Number of patients	30
Age range (years)	11-49
Age (years)	25.87±10.71
Sex (male: female)	14:16
Family history, n	1
Duration of disease (years)	6.93±4.77
Duration of stability (years)	3.7±1.98
Type of vitiligo (G/F/S), n	1/28/1
Size of treated area(cm2)	25.30±14.09

Data are mean ± SD unless otherwise stated. NCECS: Non-culture epidermal cell suspension; G: Generalized; F: Focal; S: Segmental

pin-point bleeding spots was considered the end-point. A thin film of suspension was spread over dermabraded area and subsequently dressed using dry collagen dressing and Tegaderm transparent dressing. Patients were immobilized for an hour after procedure and were advised restricted movements for duration of 1 week. Prophylactic antibiotics, anti-inflammatory drugs and analgesics were given for 1 week.

Follow-up

The response parameters were noted every fortnight. On each visit, patients were examined for evidence of partial or complete pigmentation, to record any donor or recipient site complications and to ensure that patients were not using any other treatment. Photographic documentation was done before the procedure and thereafter, periodically. Results were assessed at 6 weeks, 12 weeks and 24 weeks. Degree of repigmentation was evaluated on the basis of Visual Analogue System Score for extent of pigmentation and colour match as: 0-25% - Poor 25%-50% - Good 50%-75% - Very good and >75% - Excellent.

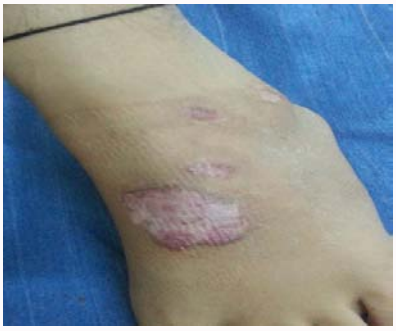

Figure 2: (A) After Surgery.

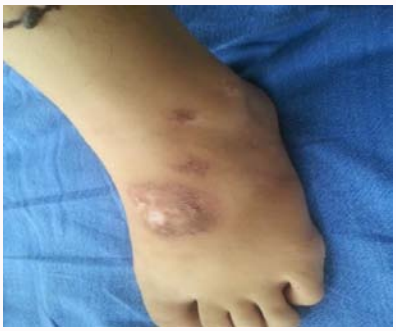

Figure 2: (B) Before Surgery.

Results

Demographic characteristics are shown in Table 1. Majority of patients had focal vitiligo. Maximum number of vitiligo lesions was present on lower limb, followed by face, trunk and upper limb. The recipient area of most cases epithelialized completely at 10 days post-operatively and no further dressing was required (Figure 1A). Onset of pigmentation started in almost all patients by 4 weeks post-op and at 6 weeks of follow-up, majority of patients (53.33%) were showing 0-25% re-pigmentation followed by 25%-50% in 46.67%. By the end of 12 weeks, 6.67% patients had excellent response with >75% re-pigmentation, 30% showed 50%-75% while majority (43.33%) of patients were still showing good response with 25%-50% re-pigmentaion. At 24 weeks, 19 (66.67%) patients had excellent (>90%) pigmentation, 5 (16.67%) had very well (50%-75%) repigmentation, 4 patients (13.33%) had good response while 2 (6.67%) patients showed poor response with <25% repigmentation (Figures 1B and 1C). All three types of repigmentation-diffuse, perifollicular, and marginal were observed but maximal patches (76.66%) showed diffuse repigmentation. Majority of patients (53.33%) had good colour match with surrounding skin while 46.67% patients had pigmentation somewhat darker than surrounding skin. 13 patients (43.33%) complained of dyspigmentation and 1(3.33%) patient had scarring at donor site. 3 (10%) and 2 (6.67%) patients respectively developed infection and scarring each, at recipient site while 1 patient (3.33%) was unable to sustain pigmentation during follow-up (Figures 2A and 2B).

Discussion

Vitiligo is an acquired, idiopathic depigmentation disorder characterized by sharply defined white patches of variable shape and dimensions [1]. Several therapeutic options, both medical and surgical are available for repigmentation of vitiligo, although none

provides truly satisfactory results. An ideal surgical modality should not only provide a good colour and texture match of recipient area with the surrounding normal skin, but also induce minimal or no complications at donor site, especially no permanent scarring. Non-cultured epidermal cell suspension is a one-time day care procedure for vitiligo allowing treatment of recipient area manifold larger than donor site area [5]. Since its introduction by Gauthier and Surleve-Bazeille in 1992 [6], the technique of NCECS has undergone several modifications. By Van Geel N et al. [7] and Mulekar et al. [4] various studies at multiple centres have established NCECS as a strategic treatment modality for stable vitiligo. We share our experience of this technique in stable vitiligo. In NCECS group, majority of patients showed poor pigmentation (53.33%) followed by 46.67% with good pigmentation at 6 weeks. At 12 weeks, excellent repigmentation was observed in 6.67% of patients and 30 % patients showed very good repigmentation. However, majority of patients still showed less than 50% repigmentation. In the study by N. Geel et al. [7] 13.55% patients showed 70% repigmentation at 12 weeks post op. At 24 weeks, excellent repigmentation (>90%) was observed in 66.67%, very good response (with 75%-90% repigmentation) in 16.67% and good response (with 50%-75% repigmentation) in 13.33% of patients. This was comparable to the study by N. Geel [7] where 57% patients showed 70% repigmentation at 3 months. The higher repigmentation rate of 92% patients with >75% repigmentation was reported in the study by Singh C et al. [8] 53.33% patients were observed to have pigmentation colour similar to the surrounding skin while 46.67% showed pigmentation somewhat darker than surrounding skin. 13 (43.33%) patients complained of dyspigmentation and 1 (3.33%) patient reported scarring with hypertrophic scar at the donor site. This was attributed to probably a deeper donor site graft. The author felt that harvesting an epidermal graft without significant donor area complications involves a learning curve for the operating surgeon. Furthermore, 3 (10%) and 2 (6.67%) patients respectively developed scarring at the recipient site, due to a deeper level of dermabrasion during preparation of recipient site.

Conclusion

Non-cultured epidermal cell suspension is a safe and effective surgical modality in management of stable vitiligo. Also, the degree of repigmentation was found to be independent of age, gender of the patient, type or duration of vitiligo, period of stability and site of patch.

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