ORIGINAL ARTICLE

Twelve-month and sixty-month outcomes of noncultured cellular grafting for vitiligo

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Background: Noncultured cellular grafting is a known surgical technique for vitiligo.

Objective: This study evaluated our center's 12-month repigmentation outcome and its maintenance up to 60 months, factors influencing repigmentation and safety data.

Methods: Clinicoepidemiologic and repigmentation data were reviewed for patients with vitiligo who had undergone noncultured cellular grafting from March 2006 to December 2012 at the National Skin Center, Singapore.

Results: All 177 patients who received noncultured cellular grafting during the study period were included. For those with available data, good to excellent repigmentation was present in 83% at 60 months. At 12 months, 88% of patients (n = 52) with segmental vitiligo achieved good to excellent repigmentation compared with 71% (n = 55) with nonsegmental vitiligo ($P < .05$). More patients on collagen dressings (82%) achieved good to excellent repigmentation compared with those who received hyaluronic acid (63%) ($P < .05$). Sites of lesions and postgrafting phototherapy did not significantly affect repigmentation outcome. Adverse reactions were uncommon and mild.

Limitations: The study is limited by its retrospective nature, the progressive loss to follow-up of patients, the absence of blinding, and the lack of use of standardized assessment tools.

Conclusion: Noncultured cellular grafting was successful in allowing more than 80% of patients to achieve good to excellent repigmentation for at least 60 months. (J Am Acad Dermatol http://dx.doi.org/10.1016/j.jaad.2016.04.007.)

Key words: noncultured cellular grafting; repigmentation; vitiligo surgery.

Vitiligo is the most common acquired hypopigmentary disorder, affecting 0.5% to 1% of the population worldwide. The burden of vitiligo and its impact on quality of life has been well documented[1,2] and for patients who have failed conventional topical treatments and phototherapy, surgical treatment of vitiligo offers a viable option for repigmentation in stable disease.

The surgical methods of vitiligo repigmentation are broadly divided into tissue (full-thickness punch grafts, thin dermoepidermal grafts, and suction-blister grafts) and cellular (cultured melanocytes and noncultured cellular suspension of melanocytes and keratinocytes) grafting. Transplantation of autologous pigmented skin grafts or blister roofs have been carried out for more than 40 years.[3] Noncultured cellular grafting was introduced in 1992 and since then, various modifications to the original technique have been described. The advantages of noncultured cellular grafting relative to tissue grafting include a higher repigmentation yield with larger recipient-to-donor surface area ratio and an improved textural outcome and, compared with cultured melanocyte suspensions,

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a faster turnaround time without the need for cell cultivation.[4]

Few studies have reported on the long-term results of noncultured cellular grafting for vitiligo.[5,6] Previously published studies have also come mainly from Western countries and India where the predominant skin phototype is different from that of our Southeast Asian population, where the majority are Chinese and the predominant skin phototype is IV. Our study also compares the use of hyaluronic acid versus collagen dressings postoperatively, and evaluates the usefulness of targeted phototherapy postgrafting. The primary objective of our study was to assess the degree of repigmentation at 12 months after noncultured cellular grafting. Secondary outcome measures included identifying factors that influence the 12-month repigmentation outcome, and evaluating the maintenance of long-term repigmentation up to 60 months and the occurrence of any adverse events. We chose to analyze factors influencing repigmentation outcome at the 12-month time point because of the gradual loss to follow-up of patients over time.

CAPSULE SUMMARY

- Noncultured cellular grafting is an effective surgical technique for repigmenting vitiligo and is associated with few complications.
- With proper selection criteria, 83% of patients achieved good to excellent repigmentation, sustained for at least 5 years postgrafting.
- Segmental vitiligo, absence of active disease, and the use of collagen dressings were associated with a better 12-month repigmentation outcome, whereas postgrafting phototherapy was not.

METHODS

This retrospective study was conducted in a tertiary dermatologic institute in Singapore and was approved by the ethics review board (study reference E/10/204). We included patients who had undergone noncultured cellular grafting at the National Skin Center, from March 2006 to December 2012. Patients were eligible for grafting if they had stable vitiligo, defined as the absence of new lesions, absence of progression of existing lesions, and absence of Koebner phenomenon in the preceding 12 months.

Patient charts and clinical photographs were reviewed to obtain data on demographics; characteristics of the vitiligo; and percentages of epidermal repigmentation at 3, 6, 12, 24, 36, 48, and 60 months postgrafting, potential factors influencing the 12-month repigmentation outcome and the occurrence of any adverse events.

The epidermal repigmentation responses were categorized as "poor," "fair," "good," and "excellent" with 25% intervals, corresponding to less than 25%, 25% to 50%, 51% to 75%, and more than 75% repigmentation, respectively.

Sessions were classified as "primary" if only 1 grafting session was carried out in the patient. Sessions were classified as "repeated" if more than 1 noncultured cellular grafting procedure was performed on the same site. All cases of repeated grafting were done because the achieved repigmentation was unsatisfactory. Sessions were classified as "staged" if multiple procedures were performed on multiple sites in the same patient at different times.

Surgical technique and postgrafting phototherapy

All patients in this study underwent noncultured cellular grafting according to the transplant protocol adopted by our center,[7] modified from the technique first described by van Geel et al[8] in 2001. An ultrathin split-skin graft one fifth the size of the recipient vitiligo lesion was harvested, using a Silvers skin grafting knife, from the patient's gluteal region under local anesthesia. The donor tissue was cut into smaller pieces and incubated in 0.25% trypsin-ethylenediamine tetraacetic acid (Sigma, St Louis, MO) for 30 minutes at 37°C. Subsequently, the donor tissue epidermis was mechanically separated from the dermis and the cell suspension was neutralized with soybean trypsin inhibitor (Sigma) and centrifuged. The cell pellet obtained was resuspended in phosphate-buffered saline (Gibco, Waltham, MA). Before April 2008, hyaluronic acid (Alcon, Sinking Spring, PA) was then added as a final step to increase the viscosity of the cellular suspension before application. After April 2008, hyaluronic acid was omitted; instead collagen dressings (Neuskin, Eucare, Chennai, India) were used to minimize "run-offs" of cell suspension, a problem encountered despite hyaluronic acid, especially on contoured surfaces.

The recipient sites were treated with topical anesthetic cream under plastic occlusion for an hour, before epidermal ablation with a flash-scan carbon-dioxide laser (Sharplan Lasers, Needham, MA). The denuded lesions were treated with the hyaluronic acid-thickened cellular suspension, covered with waterproof Tegaderm dressings (3M, St Paul, MN) before April 2008, and then secured with Hypafix adhesive bandages (Smith & Nephew, Andover, MA) for 1 week.