

## CASE REPORT

# Fibrin Glue Fixation for Suction Blister Epidermal Grafting in Two Patients with Stable Vitiligo

Hyojin Kim, Jeong-Nan Kang, Sung-Hwan Hwang, Jong-Keun Seo, Ho-Suk Sung

*Department of Dermatology, Busan Paik Hospital, Inje University College of Medicine, Busan, Korea*

Vitiligo is a chronic disorder characterized by depigmented macules which can slowly enlarge with the concurrent development of new lesions. Although autologous suction blister epidermal grafting is an established technique for the treatment of recalcitrant, stable vitiligo, the donor tissue graft is not easy to fix at the recipient site, especially in areas such as the joints, face, cutaneous folds, hands, feet, and hair-bearing areas. Therefore, various methods of donor tissue fixation have been attempted. We report two cases of vitiligo treated with suction blister epidermal grafting, with fibrin tissue adhesion. The first case is that of 16-year-old female patient presented with hypopigmented patches on the forehead and frontal scalp area. The other case is that of 32-year-old female patient presented with hypopigmented patches on the chin. We treated them with phototherapy for 1 ~ 4 years; however, the lesions were recalcitrant. Therefore, we tried treatment with a suction blister epidermal graft. Because graft fixation is difficult at the recipient sites, fibrin glue was sprayed on the grafts. Thereafter, we applied a porous silicone wound contact layer over the graft area and applied sterile gauze dressing that was left for a week. One week after the procedure, firm fixation of the donor tissue was observed in both cases. Fibrin glue seemed to improve the graft fixation, providing protection against infection and an optimal environment for wound healing. This report

suggests that the application of an epidermal graft with fibrin glufixation, can provide the best result in the surgical treatment of stable vitiligo. (**Ann Dermatol 26(6) 751 ~ 754, 2014**)

**-Keywords-**

Fibrin tissue adhesion, Skin grafting, Vitiligo

**INTRODUCTION**

Vitiligo is an acquired skin disorder that is characterized by well-defined white patches caused by the disappearance of melanocytes in the epidermis<sup>1</sup>. There are many medical therapies, such as systemic and topical corticosteroid, photochemotherapy with psoralen plus ultraviolet-A, narrow-band ultraviolet-B, topical calcineurin inhibitors, and monochromatic eximer laser, are available for the treatment of this condition<sup>1</sup>. However, in cases of recalcitrant and stable vitiligo, surgical therapy has provided higher repigmentation rates than medical therapy<sup>1</sup>. Among the many surgical therapies, suction blister epidermal grafting (SBEG), which introduces active melanocytes to the lesion sites, is an established technique for the treatment of stable vitiligo<sup>2</sup>. Firm fixation of the graft on the recipient site is considered an important factor in SBEG treatment<sup>3</sup>.

Fibrin glue is a human plasma-derived material that has a hemostatic effect, helps in graft taking, and may have a protective effect against infection and provide an optimal environment for wound healing<sup>4</sup>. It is now approved by the Food and Drug Administration for multiple indications, including for hemostasis in a wide variety of surgical specialties and for colon sealing during colostomy closure<sup>5</sup>. Furthermore, it is widely used as an adhesive in plastic and reconstructive surgery, such as for skin graft attachment in burn wound grafting and in split-thickness skin

Received October 9, 2012, Revised October 14, 2013, Accepted for publication October 17, 2013

\*This work was previously presented at The Korean Academy of Vitiligo 3rd Meeting, April 2012, Seoul, Korea.

**Corresponding author:** Jong-Keun Seo, Department of Dermatology, Busan Paik Hospital, Inje University College of Medicine, 75 Bokji-ro, Busanjin-gu, Busan 614-735, Korea. Tel: 82-51-890-6135, Fax: 82-51-897-6391, E-mail: derma09@hanmail.net

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

grafts<sup>4</sup>. However, fibrin glue fixation for SBEG has not been studied in the treatment of stable vitiligo.

In this article, we report two cases of stable vitiligo treated with SBEG with fibrin glue fixation at sites where graft fixation is difficult. We suggest that fibrin glue fixation can be an alternative method for improving the result of SBEG.

## CASE REPORT

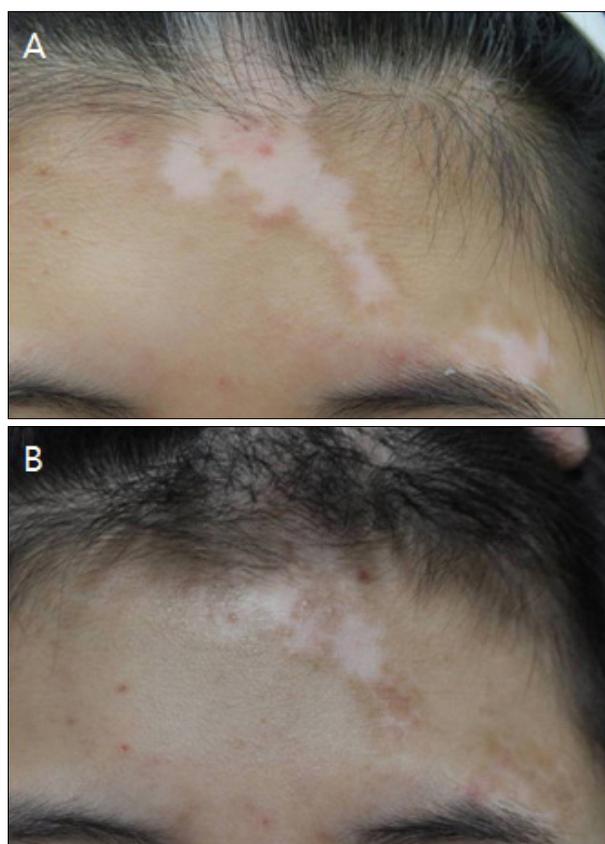
### Case 1

A 16-year-old female patient presented with well-defined 1~3 cm vitiliginous patches with poliosis on the forehead and frontal scalp area (Fig. 1A). One year ago, whitish patches with poliosis had developed on her forehead and frontal scalp area. She was treated with ultraviolet targeted phototherapy (Dualight; TheraLight Inc., Carlsbad, CA, USA) for 1 year; however, she showed no significant response to phototherapy. Therefore, we decided to try SBEG with fibrin glue fixation.

We created skin blisters by using a suction pump (HL-SC9870; Hanlim, Seongnam, Korea) on the medial aspect

of the thigh. After 2 hours of suction at 400 mmHg, small vesicles started to form, which enlarged to 1×1 cm in size; then, the blisters were carefully removed. The recipient sites were prepared by shaving the hairs on the forehead and frontal scalp area, and resurfacing with a CO<sub>2</sub> laser. The graft was carefully implanted to the denuded recipient site, and approximately 1 ml of fibrin glue (Beriplast P; Aventis Behring, Marburg, Germany) was applied on the marginal area of the graft (Fig. 2). A porous silicone wound contact layer (Mepitel; Mölnlycke Healthcare, Goteborg, Sweden) was placed on the grafts, and simple compressive dressing with dry sterile gauzes was applied.

The dressings were removed after 7 days. At that time, firm fixation of the donor tissues was observed even in the hair-bearing areas (Fig. 3). Targeted phototherapy was restarted at 4 weeks after the SBEG, and about 50%



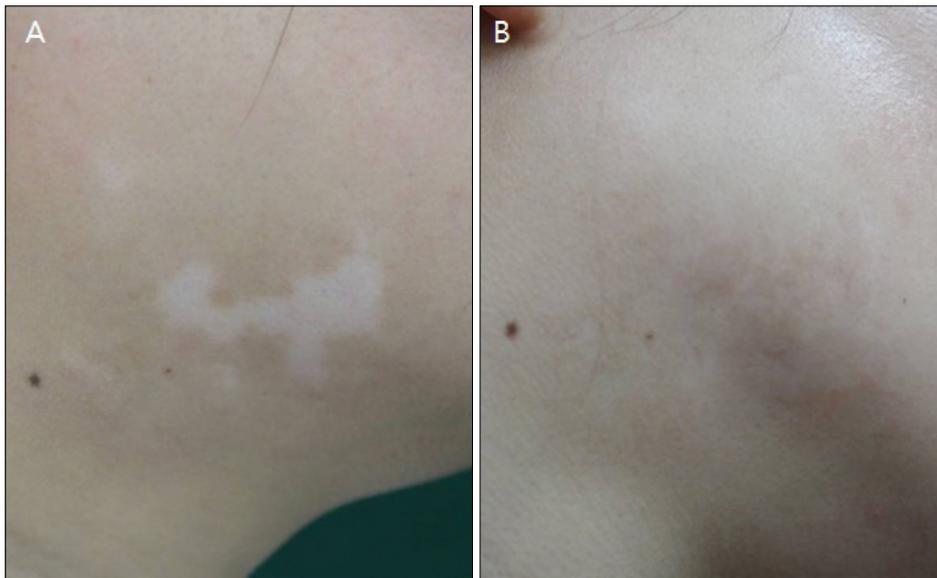
**Fig. 1.** (A) Vitiliginous patches with poliosis on the forehead and frontal scalp area of the patient in Case 1. Segmental vitiliginous area before epidermal grafting and (B) repigmentation in the vitiliginous area at 9 weeks after transplantation.



**Fig. 2.** Therapeutic procedures of suction blister epidermal grafting in the vitiligo patient. Fibrin glue was applied on the marginal area of the graft.



**Fig. 3.** One week later, firm fixation of donor tissues was observed.



**Fig. 4.** (A) Vitiliginous patches on the chin of the patient in Case 2. Segmental vitiliginous area before epidermal grafting and (B) repigmentation in the vitiliginous area at 18 weeks after transplantation.

repigmentation of the recipient areas was achieved after 6 months (Fig. 1B). No adverse effects such as scarring, pain, post-inflammatory hyperpigmentation, and Koebner phenomenon were observed in the patient.

### Case 2

A 32-year-old woman presented with 1~2.5 cm hypopigmented patches on the chin (Fig. 4A). Depigmented patches developed on her chin about 10 years ago. Targeted phototherapy (Dualight) was given twice weekly for 4 years; however, no significant improvement was observed.

We performed SBEG in the same manner as in Case 1, and the grafts were fixed by using fibrin glue. After 7 days, a good graft uptake was observed and no adverse effects were noted. Treatment with a 308-nm xenon chloride excimer laser (XTRAC Laser; PhotoMedex Inc., Montgomeryville, PA, USA) was started at 4 weeks after the grafting, and complete repigmentation of the recipient areas was achieved after 18 weeks (Fig. 4B).

## DISCUSSION

Although many medical therapeutic modalities have been improved recently, only limited successes in the treatment of vitiligo have been reported<sup>6</sup>. For patients who have recalcitrant and stable vitiligo, various surgical therapies can be applied, such as SBEG, split-thickness grafting, punch skin grafting, and transplantation of cultured melanocytes<sup>7</sup>. According to the literature, split-thickness grafting has a high success rate (>50% stable repigmentation for at least 6 months) of 78%~91%, which is

comparable to that of SBEG. However, the procedure is difficult to perform in specific areas such as the eyelids, lips, and genitalia<sup>8,9</sup>. Various adverse effects, including hyperpigmentation, milia formation, curling of the graft, scar formation at the recipient site, and scar or keloid formation at the donor site, were also reported<sup>2</sup>. Punch skin grafting is an effective method for the treatment of stable vitiligo; however, it can also induce scarring and a cobblestone appearance<sup>7</sup>. Transplantation of cultured melanocytes can provide a new source of melanocytes for larger vitiliginous lesions; however, this method is not cost-effective<sup>7</sup>.

SBEG is an established technique for the treatment of recalcitrant and stable vitiligo<sup>2</sup>. However, graft fixation is difficult in mobile areas such as the hands, foot, joints and cutaneous folds, and hair-bearing areas<sup>10</sup>. To overcome such difficulties, various methods have been attempted for the fixation of donor tissue<sup>7,11,12</sup>. The placement of stay suture is time consuming and carries the risk of tearing<sup>13</sup>. A film dressing can easily detach from cutaneous folds or hair-bearing areas, and the adhesive itself can cause graft detachment because it sticks to the graft but not to the surrounding skin<sup>13</sup>. The splint can only be applied to the extremities; however, this is inconvenient for patients.

We report the nonconventional use of fibrin glue for fixing grafts. Fibrin glue is a topical hemostat, sealant, and adhesive that imitates the final stages of the coagulation cascade when a solution of human fibrinogen is activated by thrombin. Fibrin glue has a fibrinogen component and a thrombin component, both produced from human plasma<sup>4,5,14</sup>. Fibrin glue has been shown to improve the taking of skin graft, promote hemostasis, and confer a protective effect against bacterial infection by improving

phagocyte motility in the fibrin and saturating the bacterial proteolytic enzymes by the action of the exogenous fibrin<sup>4,14</sup>. However, there is a potential risk of hypersensitivity and transmission of viral diseases (e.g., hepatitis A, B, and C; human immunodeficiency virus; Epstein-Barr virus; and cytomegalovirus)<sup>14</sup>. However, donor screening, heat treating, and use of a solvent/detergent suspension have made fibrin glues safe from viral transmission<sup>4</sup>. In a report on a large number of clinical applications, there were no adverse effects such as viral infection were observed after fibrin glue fixation<sup>14,15</sup>.

Fibrin glue seems to be an effective fixation method in SBEG. In our cases, simple dressing with nonadhesive porous silicone and dry gauzes were applied after SBEG with fibrin glue fixation. Both patients achieved >50% stable repigmentation for at least 6 months<sup>2</sup>. Our patients were satisfied with the treatment results, and no serious adverse effects were observed. Fibrin glue serves as a bioprotective film, resulting in reduced bacterial infection and conferring a protective effect by creating a physiological dressing that contributes to wound healing.

The use of fibrin glue in SBEG has some limitations. First, fibrin glue may interrupt graft attachment by permeating into the space between the graft and the underlying tissue. Second, we tried the treatment in an insufficient number of cases (i.e., two patients); therefore, despite the good results in these cases, further studies are needed. Finally, the high cost of the fibrin glue also needs to be taken into account.

Therefore, the application of an epidermal graft with fibrin glue can be an alternative treatment for stable vitiligo.

## REFERENCES

1. Felsten LM, Alikhan A, Petronic-Rosic V. Vitiligo: a comprehensive overview Part II: treatment options and approach to treatment. *J Am Acad Dermatol* 2011;65:493-514.
2. Njoo MD, Westerhof W, Bos JD, Bossuyt PM. A systematic review of autologous transplantation methods in vitiligo. *Arch Dermatol* 1998;134:1543-1549.
3. Kim HJ, Lee MH. Autologous epidermal grafting in treatment of vitiligo: evaluation for its effectiveness and patient satisfaction. *Korean J Dermatol* 2003;41:287-292.
4. Currie LJ, Sharpe JR, Martin R. The use of fibrin glue in skin grafts and tissue-engineered skin replacements: a review. *Plast Reconstr Surg* 2001;108:1713-1726.
5. Sportnitz SD. Fibrin sealant: past, present, and future: A brief review. *World J Surg* 2010;34:632-634.
6. Li J, Fu WW, Zheng ZZ, Zhang QQ, Xu Y, Fang L. Suction blister epidermal grafting using a modified suction method in the treatment of stable vitiligo: a retrospective study. *Dermatol Surg* 2011;37:999-1006.
7. Ko WC, Chen YF. Suction blister epidermal grafts combined with CO2 laser superficial ablation as a good method for treating small-sized vitiligo. *Dermatol Surg* 2009;35:601-606.
8. Olsson MJ, Juhlin L. Epidermal sheet grafts for repigmentation of vitiligo and piebaldism, with a review of surgical techniques. *Acta Derm Venereol* 1997;77:463-466.
9. Kahn AM, Cohen MJ. Repigmentation in vitiligo patients. Melanocyte transfer via ultra-thin grafts. *Dermatol Surg* 1998;24:365-367.
10. Suvanprakorn P, Dee-Ananlap S, Pongsomboon C, Klaus SN. Melanocyte autologous grafting for treatment of leukoderma. *J Am Acad Dermatol* 1985;13:968-974.
11. Skouge J, Morison WL. Vitiligo treatment with a combination of PUVA therapy and epidermal autografts. *Arch Dermatol* 1995;131:1257-1258.
12. Kim SE, Kim JR, Kim TH. The comparative study of the epidermal graft by suction blister between simple and complicated cases of vitiligo. *Korean J Dermatol* 2003;41:716-721.
13. Oh SH, Shin JY, Kim T, Kim do Y, Park SG, Hann SK. Dressing-free epidermal grafting for the treatment of perioral vitiligo. *Dermatol Surg* 2011;37:1173-1175.
14. Radosevich M, Goubran HI, Burnouf T. Fibrin sealant: scientific rationale, production methods, properties, and current clinical use. *Vox Sang* 1997;72:133-143.
15. Vedung S, Hedlung A. Fibrin glue: its use for skin grafting of contaminated burn wounds in areas difficult to immobilize. *J Burn Care Rehabil* 1993;14:356-358.