

Original Research Article

A prospective observational study of follicular unit excision grafting for the management of stable vitiligo

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ABSTRACT

Background: Vitiligo is a common acquired idiopathic and often, familial hypomelanosis, which is characterized by pale white macules that enlarges centrifugally over time. In India, vitiligo is associated with marked social stigma, thus demanding its effective management. Stable vitiligo lesions known to be relatively refractory medical therapy require surgical therapies like skin grafting or grafting of invitro cultured and non-cultured melanocytes or follicular unit excision (FUE) grafting.

Methods: A prospective observational study was done on patients of stable vitiligo. A total of 20 patients were enrolled and underwent FUE grafting for study of effectiveness and complication.

Results: A total of 20 patients of stable vitiligo were studied with or without leukotrichia in which good to excellent response was seen in 13 (65%), fair in 6 (30%) and poor in 1 (5%) patients.

Conclusions: FUE is a superior and upcoming methodology which is cost effective, reliable, less disfiguring, very low morbidity and results in good color match in patients with stable vitiligo.

Keywords: Vitiligo, Leukotrichia, Follicular unit extraction grafting

INTRODUCTION

Vitiligo is a common acquired idiopathic and often familial hypomelanosis, which is characterized by pale white macules that enlarges centrifugally over time.

Vitiligo occurs worldwide with an estimated prevalence of 0.5-1% in most populations, 0.5-2.5% in India (Handa et al) and the states of Gujarat and Rajasthan have the highest prevalence i.e. ~8.8% (Valia et al).^{1,2} In almost half of patients, vitiligo starts before the age of 20 year and males and females are affected with approximately equal frequency (Taïeb et al).³

Out of various methods of treatment of vitiligo, there are many cases of vitiligo who either fail to respond or only partially respond to medical line of treatment indicating that melanocyte reservoir is no more available for repigmentation in these areas.

Follicular unit excision (FUE) grafting is a surgical procedure which provides the melanocytes in vitiliginous patches utilizing undifferentiated stem cells of the hair follicles.

The aim of the present study was to study the efficacy of FUE grafting in cases of stable vitiligo as a modality to improve the cosmetic as well as psychological well-being of the patients.

METHODS

The present study was carried out on twenty (20) patients in the Department of Dermatology, Venereology and Leprology, Nehru hospital, BRD medical college, Gorakhpur from January 2018 to August 2019 after taking proper consent and relevant ethical approval from concern institutional authorities. Diagnosis was made on the basis of relevant history including family history and proper clinical examination including the age of onset, duration, type and site of lesion, progression of disease and history of previous treatments if any. Histories of chronic illness like tuberculosis, hypertension or diabetes mellitus or any history suggestive of association with vitiligo was taken.

The complete clinical examination was carried out in good day light with special attention towards cutaneous lesions. The skin lesion characteristic of vitiligo viz. number of lesion, shape, size, color, site, and atrophy of skin lesion because of topical application of steroid cream or ointment were noted.

All the patients were investigated for complete hemogram, bleeding time, clotting time, hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV). Lignocaine sensitivity was done before the surgery.

Twenty patients were selected according to the pre-defined inclusion and exclusion criterions as mentioned below.

Inclusion criteria

Inclusion criteria were patients willing for treatment and follow up with written consent; patients not responding adequately to medical treatment; patient should be stable for 12 months (i.e. no new lesions, no expansion of old ones); patients aged between 15 to 60 years.

Exclusion criteria

Exclusion criteria were patients less than 15 years of age and patients receiving any concomitant medical treatment; patients who are positive for infectious diseases like HIV, HBV and HCV; patients who have history of koebnerization, keloidal tendency and coagulative disorders or patients on anticoagulant medications such as aspirin, warfarin and heparin.

Material required

Povidone iodine, savlon solution, spirit, xylocain 2%, gloves, syringe, insulin syringe petridish, surgical cap and mask, micro motor, FUE punch of size 0.9 mm, straight forceps, angled forceps, optical loop, petridish with normal saline, hair transplant forceps, ice pack, digital camera.

Method of FUE grafting

On the day of surgery, the entire donor area from the back of the head is trimmed to 1-2 mm length. The patient lies in the prone position on the operating table. The donor area was the occiput or post auricular region as per requirement.

After giving tumescent anesthesia (lignocaine with 1:100,000 adrenaline diluted in the ratio of 1:10 with normal saline) the donor follicles were extracted by using FUE punch of 0.9 mm by FUE technique. The extracted hair follicles were stored in petri dish with cold normal saline till the transplantation was completed.

After infiltrative anesthesia at the recipient site, slits was created by using 18G needle 3-5 mm apart and the hair follicles were gently inserted using a jeweler's forceps into the created slits after maintaining hemostasis. The hair follicles were transplanted as follicular units. Paraffin gauze dressing was done under aseptic measures, both over donor and recipient area. The patients were kept under broad spectrum antibiotic coverage for seven days.

Patients were followed up after one week, and further put on "PUVASol" therapy and topical tacrolimus after proper wound healing, then at monthly intervals to observe repigmentation or any complications and the response to treatment up till 6 month and the results were assessed at the end of 6 month. Pre and post photographs and follow up photographs were documented.

The result of study was evaluated on the basis of clinical and photographic assessment and the response was classified as excellent, good, fair and poor if pigmentation was 100-75%, 74%-50%, 49%-25%, <25% respectively.

The percentage reduction in size was calculated as follows:

Percentage reduction in the size= (Initial area - area at present)/ Initial area ×100.

The collected data was analysed using Microsoft excel and presented in number and percentages.

RESULTS

The study included 20 patients of stable vitiligo of the nonglabrous skin at various sites of the body treated with FUE grafting.

Among the 20 patients, 5 (25%) were males and 15 (75%) were females. The age of these patients ranged 15-60 years. Maximum ages of patients were between 31-45 years of age (Table 1).

Table 1: Distribution of patients according to age and sex.

Age group (in years)	Sex		Total	
	Male	Female	No	%
15-30	01	05	06	30
31-45	03	07	10	50
46-60	01	03	04	20
Total	05	15	20	100

Table 2: Site of vitiligo involved in order of frequency.

Site	No of patients	%
Lower extremities	13	65.00
Trunk	03	15.00
Upper extremities	04	20.00
Total	20	100

Out of the twenty patients treated, the lesions were most commonly located at lower extremity and trunk while rest was located at upper extremity (Table 2).

Only nonglabrous skin was treated with this method. The duration of vitiligo ranged from 2-20 years with a mean duration of 5 years.

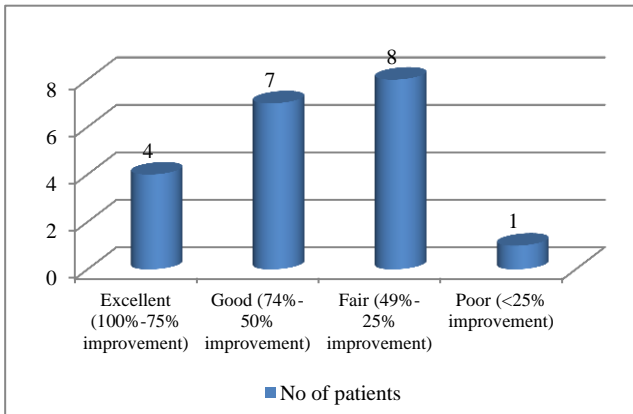


Figure 1: Result of FUE grafting after 1 month (n=20).

After the uptake of the hair follicles, onset of pigmentation ranged 2-6 weeks. Maximum of lesions showed pigmentation between 3-4 weeks. The median time for the onset of pigmentation was 4 weeks (Figure 1).

Using the visual analogue score for assessment good to excellent response was seen in 11 (55%), fair in 8 (40%), and poor in 1 (5%) patients when assessed 1 month after FUE grafting (Figure 1) and on further evaluation at 6 months excellent to good response was seen in 13 (65%), fair in 6 (30%), and poor in 1 (5%) patients (Figure 2) (Figures 3A-C and 4A-C).

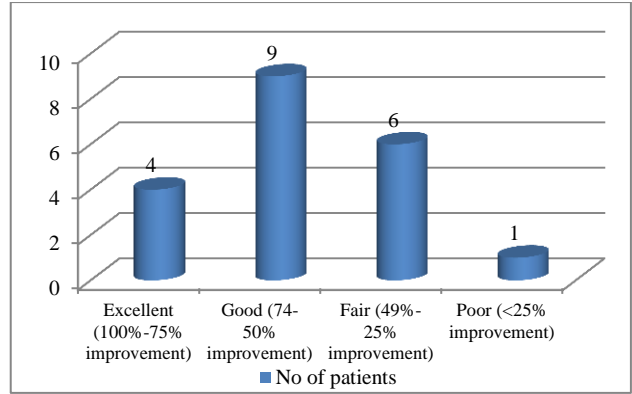


Figure 2: Result of FUE grafting after 6 months (n=20).



Figure 3: Results of FUE grafting immediately and in subsequent follow ups; (A): immediately, (B): 1 month and (C): 6 months after surgery.



Figure 4: Results of FUE grafting immediately and in subsequent follow ups; (A) immediately, (B) 1 month and (C) 6 months after surgery.

DISCUSSION

FUE grafting is a surgical procedure, which can be used to transplant follicular units into vitiliginous areas. Such follicular unit transplant has been recently used to repigment stable vitiligo patches. During the second half of the twentieth century in 1959, Staricco showed amelanotic melanocytes in the external root sheath of hair follicles that suggested immature pigment cells.⁴ Further in 1979, a melanocyte reservoir was proposed in the hair follicle by Ortonne et al who described the presence of DOPA negative, non-dendritic pigment cells along the external root sheath that migrated toward the basal cell layer to become functionally active in patients treated

with PUVA for vitiligo.⁵ Cui et al studied the different stages of repigmentation of vitiligo and confirmed the existence of a melanocyte reservoir in the ORS of hair follicles.⁶ Vitiligo is a process in which only active (melanin-producing) melanocytes are destroyed and the inactive melanocytes in the ORS are preserved and serve as the source for repigmentation. Recovery of vitiligo is initiated by the proliferation of these inactive melanocytes, followed by the upward migration to the nearby epidermis to form perifollicular pigment islands and the downward migration to the hair matrices to produce melanin. Arrunátegui et al suggested that melanocytes from the implanted lower third of the hair follicle can act as a reservoir and are able to migrate and repigment achromic areas in vitiligo.⁷ Grichnik et al in 1996 demonstrated immature dendritic, tyrosinase negative and c-kit positive pigment cells mainly concentrated around the follicular ostium and to a lesser extent in the rete pegs and the outer root sheath, suggesting a source of not fully mature pigment cells that were available for epidermal repigmentation.⁸

Na et al first introduced follicular unit transplant to repigment vitiligo patches to evaluate the effectiveness of single hair grafting in patients with vitiligo.⁹ Single hairs were grafted into vitiliginous areas of 21 patients. Repigmentation around the grafted hair was observed in 15 patients (71%) within 2 to 8 weeks. Vanscheidt et al conducted a study in 2011 using single-cell suspension of "plucked" hair follicles in the treatment of vitiligo.¹⁰ They found almost complete (>90%) repigmentation in 3 of 5, 50% in 1 and <10% repigmentation in 1 patient. Single follicular unit transplant conducted by Kumaresan in 2011 showed excellent repigmentation after 4-8 weeks with no recurrence in a case of vitiligo.¹¹ Thakur et al, in 2015 conducted a study of hair follicular transplantation on fifty patients with 63 lesions of stable vitiligo.¹² Of the 63 patches, good to excellent response was seen in 39 (61.9%), fair in 16 (25.4%) and poor in eight (12.7%) lesions. No repigmentation was seen in two (4.8%) lesions. The mean improvement seen was 61.17%.

Our study showed comparable results with initial repigmentation starting 3-4 weeks after the surgery. Good to excellent response was seen in 11 (55%), fair in 8 (40%), and poor in 1 (5%) patients when assessed 1 month after FUE grafting and on further evaluation at 6 months excellent to good response was seen in 13 (65%), fair in 6 (30%), and poor in 1 (5%) patients. In the present study, we used 0.9 mm FUE punch to obtain follicles from the donor site while the previous studies have dissected the hair follicles to obtain single hair follicles that were then transplanted onto the recipient site.¹¹ On the contrary, our study transplants the whole follicular unit onto the recipient sites (FUE). Advantages of this procedure are that the hair follicle provides much more melanocytes and stem cells with better acceptability to the color match. As occipital area is the last to and most resistant to shed of hairs it was chosen as the donor site of my study with the added advantages of better

cosmetic outcome like minimal visibility of scar and post-operative hyperpigmentation. This method can be applied to a small to large area of vitiligo and can be performed in the areas like eyelashes or at the angle of the mouth where other surgical methods are difficult to perform.

CONCLUSION

FUE is an evolving, safe and inexpensive method of surgical repigmentation in stable vitiligo. It does not require special equipment or a sophisticated operation theater setting. Small and stable lesions affecting the hairy areas can be easily and effectively treated by this method. Leukotrichia was also found to improve with this procedure, though the time taken was longer as compared to the skin lesions. When combined with other procedure it enhances the cosmetic results in patients of stable vitiligo. Using FUE rather than the strip method (FUT) simplifies the procedure and reduces the chances of complications and excellent repigmentation.

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