Original Article

New Method of Treatment of Scarring Alopecia with Follicular Unit Hair Extraction Combined with Platelets Rich Plasma

Mohammad J. Kadhum[1,*], Mohammad Kadhim Al-Hattab[2], Ahmed Hasan R. Al-Zurfi[2]

[1] Department of Internal Medicine, College of Medicine, University of Kufa, Al-Najaf 54001, Iraq.

[2] Department of Internal Medicine, Hammurabi College of Medicine, University of Babylon, Hilla 51002, Iraq.

[*] Corresponding author: dr79mohamad@yahoo.com

Submission: May 28, 2025 Accepted: June 23, 2025 Published: June 30, 2025

Abstract

Background: Scarring alopecia (SCA) also known as cicatrical alopecia represents a group of disorders in which hair follicles are permanently destroyed and replaced with scar tissue and permanent hair loss. **Objectives:** To evaluate the effectiveness of follicular unit (FU) hair transplantation as a novel technique for the treatment of scarring alopecia compared with conventional surgical methods such as excision, local flap reconstruction, and tissue expansion. **Materials and Methods:** This study included patients with SCA of the scalp and beard area of different causes, was performed at private clinic in Al Najaf city from the 1st of January 2022 to the end of December 2023. The patients underwent a single session of hair transplantation combined with platelet rich plasma with number of graft range from 900 to 4800 grafts according to scar area. The results of patients with noticeable improvement in the photographs and patient satisfaction were recorded at 3&6 months after the procedure. **Results:** Fifteen patients were enrolled. Most of causes related to trauma, burn, surgical excision and tinea capitis .The hair growth started after three months and density of hair increase after six months. The patient and observer satisfaction significantly improved after the procedure, without significant side effect. **Conclusions:** FU hair transplantation could be an effective method for managing scar tissue and had several advantages, including a high transplantation survival rate and satisfactory postoperative results.

Keyword: Scarring alopecia, Follicular, unit hair extraction, PRP.

Introduction

Scarring alopecia (SA) also known cicatricial alopecia represents a widely diverse group of disorders in which hair follicles are permanently destroyed and replaced with scar tissue and permanent hair loss [1]. Scarring alopecia can be divided into 2 types, “stable” and “unstable.” Stable scarring alopecia occurs as a result of a single exposure or event, such as burns, trauma, radiation, or surgery. Unstable scarring alopecia occurs in conditions that relapse and recur over time, such as Discoid lupus erythematosus, Systemic lupus erythematosus, lichen planus, folliculitis decal vans, linear scleroderma, and sarcoidosis [2]. It also can result from certain medications, like cyclophosphamide as a side effect. Location of hair loss can also be particular to the underlying disease process; for example, central centrifugal cicatricial alopecia is most commonly seen on the scalp vertex, whereas frontal fibrosing alopecia typically affects the frontal hairline in a band like pattern [3]. Clinical and Trichoscopy observation of hair in scarring area is a very useful tool in the differential diagnosis of scalp condition. The histological examination is usually mandatory to confirm the diagnoses and to evaluate disease activity [4]. Trichoscopy is a useful tool to select the best area where to perform skin biopsy, as in unstable scarring alopecia the most representative area is usually the edge of the scarring area, where follicular ostia are still present and inflammatory

signs are still evident [5]. Hair transplantation has been conducted for decades and has experienced a cosmetic revolution in the 21st century and identical to all surgical procedures, there has been a continual evolution in this procedure with the goal of an ever safer, efficient, and even higher level of patient satisfaction [6]. In the earliest hair transplants, a punch was used to extract donor hair follicles for repair of regions of the moustache, beard, and eyebrows scarred by burns' but recently surgical management of hair loss has become an increasingly satisfying and popular method [7]. A successful hair transplant procedure should consider the extent of hair loss, density of donor hair, caliber and color of hair, and also a realistic expectation of the patient and physician [8]. A challenge for the hair transplant surgeon is to reach an acceptable distribution of transplanted hair and creates a permanent natural hairline and over time, the transplanted hair remains cosmetically satisfying for the patient and physician [9]. Consultation is the key point for a successful procedure considering the key points in every consultation including the history of hair loss, the patient's physical examination, the patient's goals, the use of medications in treatment of the hair loss, and where to transplant [10]. The key points in the patient's physical examination are the donor density (hair follicles per cm^2), the caliber of the patient's hair, and the extent of hair loss [9]. The harvesting of donor hair follicles can be accomplished by amputating a strip of hair-baring skin called strip harvesting or follicular unit transplantation (FUT) method and by removing each follicle individually via follicular unit of harvesting follicular units from a donor site and the surgeon extracts individual follicular units with circular punches (0.8 to 1 mm in diameter) that heal by second intention within a few days [11]. Platelet-rich plasma (PRP) is a concentration for platelets 7 times the amount in normal plasma. Because the underlying disease process in scarring alopecia is inflammatory, PRP is another treatment option because of the various growth factors it contains, such as platelet-derived growth factor and vascular endothelial growth factor, which influence wound healing, tissue repair, and remodeling of scar tissue [12]. In one prospective randomized controlled trial that followed participants for 2 years, patients with androgenic alopecia who received PRP injections alone had increased mean number of hairs, mean hair density, epidermal thickness, and number of hair follicles 2 weeks after the last PRP treatment compared with patients who received placebo [13]. In another prospective randomized controlled trial, patients with androgenic alopecia who underwent hair transplantation and received intraoperative PRP immediately after the donor recipient sites were created had greater than 75% hair regrowth after 6 months; furthermore, activity in dormant hair follicles were seen in all 40 patients who received PRP while only in thirteen patients of the placebo group [14]. Furthermore, several case studies and retrospective review studies have shown that the use of PRP alone and in combination with topical and intralesional steroids improved the hair density of patients specifically with scarring alopecia [15, 16]. This study aimed to assess the clinical outcomes and therapeutic potential of follicular unit (FU) hair transplantation as an innovative approach for managing scarring alopecia, in contrast to traditional surgical techniques including excision, local flaps, and tissue expansion.

Materials and Methods

This study is a clinical case series included patients with SCA of the scalp and beard area of

different causes, like burn, trauma, surgery, tinea capitis and lichen planus. Performed at private clinic in Al Najaf city from the 1st of January 2022 to the end of December 2023. Treatment plans were made after history taking of any relevant medical condition or medication, physical examination and type and depth of scars. Preoperative and postoperative guidelines were shared with the patient and a written signed consent letter was provided**.** Factors to consider in assessing hair transplantation for scarring alopecia include donor hair availability, scalp laxity; the patient's healing patterns, vascular supply in recipient region. Hair grafts are less likely to take during an active disease state. Prior to surgery, the patients avoid using any medicines (aspirin, warfarin) which might result in intraoperative bleeding and resultant poor "take" of the grafts. Avoid smoking and alcohol 2 days before and after the procedure. Preoperative tranquilizer (diazepam) in an anxious patient. Blood investigations were performed which included hemoglobin, platelet count, bleeding time, clotting time, prothrombin time. Anti-retrovirus 1 and 2 serology, Hepatitis B surface antigen and anti-Hepatitis C antibody were performed. Preoperative photographs for scarring area were taken. On the day of surgery, the donor area from the back of the head was trimmed to 1–2 mm length. The patient instructed to lie down on the operation theatre table in prone and supine positions for the complete local anesthesia. The ring block was administered in occipital scalp using a 31 G needle, infiltrating 2% lidocaine with adrenaline. Thereafter, tumescent anesthesia was administered using 100 ml of normal saline, 10 ml of 2% lidocaine and 1 ml of adrenaline (1:1000). After administering of tumescent anesthesia, 4-5 test grafts are separated and extracted to look for the size and length of the grafts. The grafts are then extracted from the donor area with the help of 0.9 mm special micro punches. After extraction, the assistant gently takes out the graft with the help of forceps. After collection and calculate a number of extracted grafts then preserved in separately on pieces of gauze in Petri dishes containing cool Ringer's lactate solution . Then make small incision in scarring area by using special blade according to the size of hair graft in recipient site, then insertion the graft one by one with special forceps. The patients underwent a single session of hair transplantation with number of graft range from 900 to 4800 grafts according to scar area combined with platelet rich plasma (PRP). Four sessions of PRP were given for patients every month as adjuvant therapy. PRP contains various growth factors, such as platelet-derived growth factor and vascular endothelial growth factor, which influence wound healing, tissue repair, and remodeling of scar tissue. The results of patients with noticeable improvement in the photographs and patient satisfaction were recorded at 3&6 months after the procedure. During the first twenty days, virtually all of the transplanted hairs, inevitably traumatized by their relocation, will fall out. This is referred to as "shock loss". After three months, new hair will begin to grow from the moved follicles. The patient's hair will grow normally and continue to thicken through the next six to nine months. The patients were seen regularly every 4 weeks after procedure and record time initiation of growth of hairs. Each visit, we evaluated the site of recipient area, recorded any complication and took photographs. All the patients were evaluated objectively and subjectively regarding their initiation of hair growth after the procedure.

The objective method included Photographic assessment. The percentage of hair growth was determined by assessment of photographs at the

end of the study in computer view blindly by two independent, out-of-the study, dermatologist, and they notified their opinions about the degree of improvement. The subjective method is the Patient's satisfaction with hair growth. Patient satisfaction questionnaire with FUE procedure in terms of hair growth was recorded on linear analogue scales (LAS) with 0 = not at all satisfied and 10 = extremely satisfied. Any incidence of immediate or delayed complications was assessed and recorded at each visit, including pain, crusting, and/or folliculitis at donor and recipient site.

Statistical analysis

Statistical analysis was carried out using SPSS version 26. The Pearson Chi-Square test was used to find the association between categorical variables. $P \leq 0.05$ was considered significant.

Ethical approval

The College of Medicine at the University of Kufa ethical committee approved this study's ethical approval, obtaining verbal consent from each specimen of this study.

Results

Fifteen patients were enrolled in this study. Their ages from 19-54 years with mean ± SD of (31.20±10.51 years). The duration of scarring varies between 3 - 21 years with mean ± SD of (8.87± 5.47 years). Male subjects consisted 60% of the patients. FUE was targeted for transplantation, scalp (80%) and beard area (20%). maximum number of grafts (range: 900-4800) as in table (1). Burn (46 .7%) was the most causative agent responsible for scar alopecia in this study and the least were tinea capitis (13.3%) and lichen pilanopilaris (6.7%) registered in their medical history as in figure (1).

Table 1: Demographic characteristic patents with scarring alopecia.

Patient number	Age	Sex	Duration months	Causes	No. of graft	Site
1	23	male	12	trauma	1300	scalp
2	35	male	21	burn	900	beard
3	27	male	6	burn	2100	scalp
4	54	female	10	burn	3200	scalp
5	42	male	7	truama	1600	beard
6	25	female	5	surg	1100	beard
7	46	female	8	burn	1900	scalp
8	36	male	18	surg	2700	scalp
9	19	female	13	tinea	1800	scalp
10	24	male	2	burn	4800	scalp
11	26	female	4	Burn	1400	scalp
12	22	female	9	Tinea	2200	scalp
13	41	male	11	Trauma	1450	scalp
14	27	male	4	Lichen	2120	scalp
15	21	male	3	Burn	1370	scalp

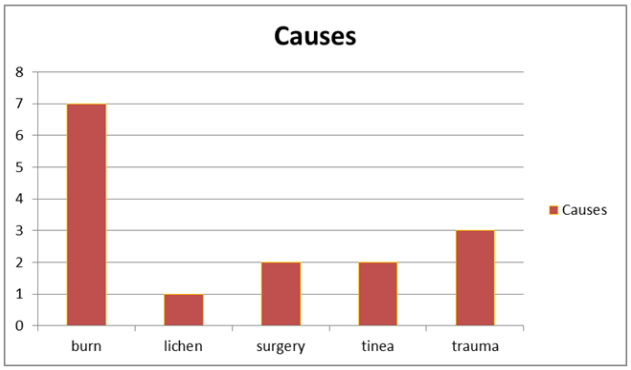

Figure 1: Show causes of scarring alopecia.

The result was assessed after three and six months after the procedure. At third months after FUE treatment, the mean percentage of hair growth (55%). While after sixth months, the resultant increase was (74.3 %). All patients had a significant percentage of hair growth after third and six months of procedure and the P value = 0.001(statistically highly significant). The median satisfaction of the patient was assessed at

three and six months after procedure according to the visual analogue score. At third months, median patient's satisfaction scores were (5). At the end of follow up period, patient satisfaction was increased to a median (8). Patient satisfaction with hair growth was statistically highly significant at all stages of follow - up (P value=0.001) as in table (2).

Table 2: Percentage of hair growth and patients satisfaction after 3and 6 months of treatment

Mean	After 3 months	After 6 months	P value
Percentage of hair growth	55	74.3	0.001
Patients satisfaction	4.53	7.86	0.001

The results of the visual assessment of hair growth on scalp for a computer view of each patient's photographs before and after treatment were tabulated (Figure 2, 3, 4).

B. After

Figure 2: A 27 years old male patient with burn in right temporal area treated with 2100 grafts.

A. Before

A. Before

B. After

Figure 3: A 23 years old male patient with trauma before and after 1300 hair grafts.

B. After

Figure 4: A 24 years old male patient before and after 4800 hair grafts.

A. Before

Discussion

Follicular unit extraction (FUE) is a minimally invasive procedure to obtain follicular units, from safe donor area, using a circular hollow blade called punch. The extraction leaves a circular wound that heals with primary intention, leaving only a tiny scar. It is a suture less procedure and results in a better wound healing [17]. Our study used FUE in treatment patients with scarring alopecia in comparison with the traditional surgical treatment methods like excision, local flap, and tissue expansion, which can result in additional scarring, an unfavorable hair growth direction, and vascular network compromises [18]. In our study, trauma, burns, surgical excision of adjacent skin, radiotherapy and leishmaniasis were the major causes in the medical history leaving scar. In hair transplantation, both techniques of FUE and

FUT can be state of the art with advantages and disadvantages for the patient considered during ahair transplant consult. Therefore, someone wholikes to wear his hair short, FUE should be chosenas the preferred harvesting technique because scarring from FUE is less visible than a linear scar from FUT [17].

Conclusion

FU hair transplantation could be an effective method for managing scar tissue and had several advantages, including a high transplantation survival rate and postoperative satisfactory results. Therefore, we recommend conducting further studies with a larger patient sample to reflect a more accurate success rate. Additionally, future research should include other systematic causes of alopecia to assess the effect of this therapy in a wider range of etiologies.

Interest Conflicts

None**.**

Financial support and sponsorship

None.

References

[1] Filbrandt R, Rufaut N, Jones L, Sinclair R. Primary cicatricial alopecia: diagnosis and treatment. Can Med Assoc J 2013;185(18):1579–85.

[2] Unger W. The surgical treatment of cicatricial alopecia. Dermatol Therapy 2008;(21):295–311.

[3] Zampella J, Kwatra SG, Alhariri J. Correlation of clinical and pathologic evaluation of scarring alopecia. Int J Dermatol 2019;58(2):194–7.

[4] Berdardez C, Molina-Ruiz AM, Requena L. Histologic Features of Alopecias: Part II: Scarring Alopecias. Actas Dermosifiliogr 2015;106:260-70.

[5] Rakowska A, Slowinska M, Kowalska-Oledzka E, Warszawik O, Czuwara J, *et al.* Trichoscopy of cicatricial alopecia. J Drugs Dermatol 2012;11:753-8.

[6] Rassman WR, Bernstein RM, McClellan R, Jones R, Worton E, Uyttendaele H. Follicular unit extraction: minimally invasive surgery for hair transplantation. Dermatol Surg 2002;28(08): 720–728.

[7] Goldman BE, Goldenberg DM. Nape of neck eyebrow reconstruction. *Plast Reconstr Surg* 2003;111:1217-20.

[8] Cole J, Devroye J. A calculated look at the donor area. Hair Transplant Forum Intl 2001;11:150–154.

[9] Avram M, Rogers N. Contemporary hair transplantation. *Dermatol Surg* 2009;35:1705-19.

[10] Tomc CM, Malouf PJ. Eyebrow restoration: the approach, considerations, and technique in follicular unit transplantation. *J Cosmet Dermatol* 2015;14:310- 14.

[11] Rosati P, Barone M, Alessandri Bonetti M, et al. A SystematicReview of Outcomes and Patient Satisfaction Following Surgical and Non-surgical Treatments for Hair Loss. *Aesthetic Plast Surg* 2019 Aug 26.

[12] Alves R, Grimalt R. A review of platelet-rich plasma: history, biology, mechanism of action, and classification. Skin Appendage Disord. 2018;4(1):18–24.

[13] Gentile P, Garcovich S, Bielli A, et al. The effect of platelet-rich plasma in hair regrowth: a randomized placebo-controlled trial. Stem Cells Transl Med 2015;4(11):1317–23.

[14] Garg S. Outcome of intra-operative injected plateletrich plasma therapy during follicular unit extraction hair transplant: a prospective

randomized study in forty patients. J Cutan Aesthet Surg 2016;9 (3): 157- 64.

[15] Saxena K, Saxena DK, Savant SS. Successful hair transplant outcome in cicatricial lichen planus of the scalp by combining scalp and bear hair along with platelet rich plasma. J Cutan Aesthet Surg 2016;9(1):51–5.

[16] Dina Y, Aguh C. Use of Platelet-rich plasma in cicatricial alopecia. Dermatol Surg 2018.

[17] Bernstein RM, RassmanWR, Anderson KW. Follicular unit extraction mega sessions: evolution of a technique. Hair Transplant Forum Int. 2004;14:97–99.

[18] W. Unger, R. Unger, and C. Wesley, "The surgical treatment of cicatricial alopecia," *Dermatologic Therapy*, vol. 21, no. 4, pp. 295–311, 2008.