



Surgical correction of primary cicatricial alopecia: Experience with nine patients

Primer skatrisyel alopesinin cerrahi olarak düzeltilmesi: Dokuz hasta ile olan deneyim

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Abstract

Background and Design: Primary excision and hair transplantation are infrequently used to treat stable primary cicatricial alopecia (PCA). Follicular unit extraction (FUE) method has gained popularity in recent years. In this study, we aimed to investigate long-term results and effectiveness of hair transplantation in the treatment of PCA.

Materials and Methods: In this study, 9 patients with stable (at least for a year) and histopathologically proven PCA, who were treated with FUE hair transplantation between 2011 and 2014, were evaluated retrospectively. Medical archive data was used to retrieve treatment details and results of the treatment. Patient satisfaction was evaluated by using a five-point Likert scale.

Results: Nine patients with a median age of 41 years were included retrospectively in this study. Median disease duration was six years and median stable disease duration was two years. Histopathological diagnoses were lichen planopilaris (4 cases), frontal fibrosing alopecia (2 cases), pseudopelade (2 cases), and folliculitis decalvans (1 case). Test transplantation sessions were performed in three patients who were under 30 years of age or who were clinically suspected to have non-stable PCA. Hair transplantation was not performed in one patient due to disease activation after the test transplantation session. Median 1250 grafts were transplanted in eight patients with using FUE technique. The patients were regularly followed up for a median of 26 months duration. Only one patient, out of eight transplanted, experienced reactivations in donor and recipient area in the postoperative second year. In seven transplanted patients, there was not any reactivation and five patients were very satisfied with the result of hair transplantation.

Conclusion: Optimal long-term results following surgical treatment can be achieved in PCA patients with proper patient selection. In this selected group of PCA patients, FUE method of hair transplantation is a reliable choice of surgical treatment method.

Keywords: Primary cicatricial alopecia, hair transplantation, follicular unit extraction, FUE, graft, treatment

Öz

Amaç: Stabil primer skatrisyel alopesiyi (PSA) tedavi etmek için primer eksizyon ve saç ekimi ender olarak kullanılmaktadır. Son yıllarda foliküler ünite ekstraksiyon (FUE) yöntemi popülerite kazanmıştır. Bu çalışmada PSA'da saç ekimi tedavisinin uzun dönemli etkileri ve etkinliğinin araştırılması amaçlanmıştır.

Gereç ve Yöntem: Bu çalışmada, 2011-2014 yılları arasında, histopatolojik olarak ispatlanmış ve stabil (en az bir yıl) PSA'sı olan ve FUE saç ekimi yöntemi ile tedavi edilmiş hastalar retrospektif olarak değerlendirilmiştir. Tedavi detayları ve sonuçlarına tıbbi kayıtların incelenmesi sonucu ulaşılmıştır. Hasta memnuniyeti beş noktalı Likert skalası kullanılarak değerlendirilmiştir.

Bulgular: Bu çalışmaya ortalama yaşı 41 olan dokuz hasta retrospektif olarak dahil edildi. Ortalama hastalık süresi altı yıl ve ortalama stabil hastalık süresi iki yıl idi. Histopatolojik tanımlar liken planopilaris (4 olgu), frontal fibrozan alopesi (2 olgu), psödopelad (2 olgu) ve folikülitis dekalvans (1 olgu) idi. Otuz yaş altında olan veya klinik olarak stabil olmayabileceği düşünülen üç olguda test ekim seansları yapıldı. Test ekim seansında aktivasyonu olan bir olguya saç ekimi yapılmadı. Sekiz hastaya FUE tekniği kullanılarak ortanca 1250 greft ekildi. Hastalar işlem

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sonrası düzenli olarak ortalama 26 ay boyunca takip edildiler. Saç ekimi yapılan sekiz olgudan sadece bir tanesinde, hem alıcı hem de donör alanda, postoperatif ikinci yılda reaktivasyon görüldü. Ekim yapılan yedi olguda herhangi bir reaktivasyon yoktu ve beş tanesi saç ekimi sonucundan çok memnundu.

Sonuç: Uygun hasta seçimi ile PSA olgularında yapılacak cerrahi tedavi sonrası uzun dönemli ideal sonuçlar elde edilebilir. Bu seçilmiş PSA hasta grubunda FUE yöntemi ile yapılacak saç ekimi güvenli bir cerrahi tedavi yöntemidir.

Anahtar Kelimeler: Primer skatrisyel alopesi, saç ekimi, foliküler ünite ekstraksiyonu, FUE, greft, tedavi

Introduction

Primary cicatricial alopecias (PCAs) are a poorly understood group of diseases and they are associated with hair follicle destruction secondary to inflammation¹⁻³. This usually transforms hair follicles into a scar-like fibrous tissue with permanent hair loss¹⁻³. PCA constitutes 7% of all hair loss cases¹. Although history, physical and dermatoscopic examinations are helpful in the diagnosis of PCA, biopsy is the gold standard diagnostic method². Dermal histopathological appearance differs depending on the type of primary cicatricial alopecia; lymphocytic [lichen planopilaris (LPP), frontal fibrosing alopecia (FFA), pseudopelade, chronic cutaneous lupus erythematosus and central centrifugal cicatricial alopecia], neutrophilic (folliculitis decalvans and dissecting cellulitis) or mixed (erosive pustular dermatosis and acne keloidalis)^{2,3}. Burned out neutrophilic PCA typically appears as a true scar as a result of diffuse dermal fibrosis and elastic tissue loss³.

In humans, no current method is available to provide follicular neogenesis and it is the resulting permanent hair loss that causes psychosocial problems and loss of self-confidence in patients with hair loss^{1,2}. For this reason, PCA is one of the trichology emergencies and aggressive treatment to eliminate disease activity should be planned immediately⁴. Early diagnosis and appropriate treatment are necessary to minimize the extent of resulting permanent alopecia^{2,3}. Unfortunately, available medical treatment modalities can only be used to prevent or slow down the progression of the disease and ameliorate symptoms². However, there is not any form of medical treatment that improves permanent hair loss. Therefore, reconstructive surgical modalities, which are increasingly being used, represent an important alternative approach for PCA treatment. Primary excisions, scalp reduction, tissue expansion with flap surgery and hair transplantation are surgical modalities that can be used in PCA treatment^{1,2,5}.

The follicular unit extraction (FUE) method of hair transplantation has recently gained popularity⁶ and it has been used for the treatment of cicatricial alopecia due to many advantages. However, hair transplantation in cicatricial alopecia has some important technical differences when it is compared to classical hair transplantation in male pattern androgenetic alopecia (AGA) depending on the disease process and the character of scar⁵. Moreover surgical treatments are recommended after a stable period of one or two years and active phase of the disease terminates during this period^{2,5,7}. However, there are only a few studies in the literature that show long-term results of surgical treatments⁸⁻¹⁰.

In this study, the aim was to investigate the effectiveness of FUE method of hair transplantation in PCA treatment and present long-term follow-up results in patients who were treated with this method.

Materials and Methods

Patients with a histopathological diagnosis of PCA, who were treated with FUE hair transplantation method in a single clinic owned by one of the authors (EC), were enrolled in this study. Since it was a retrospective case series, there was no ethics committee approval,

but written and verbal consent of the patients were obtained. During the treatment, the principles of the 1975 Declaration of Helsinki were followed. Only patients who were stable with regard to disease activity for at least one year were treated in this study. Patients with erythema, itching, squamation and positive pull test were considered to be in the active phase of disease and were not treated. Nine patients were operated between 2011 and 2014. After detailed pre-operative medical and family history of the patients was obtained, physical and dermatoscopic examinations were performed. Hair frequency in the donor area and the estimated number of grafts needed for reconstruction were evaluated. The bleeding pattern was evaluated by using a 19G needle prior to the procedure as described before⁵. Male and young patients were additionally examined with regard to AGA. Their family histories were taken, and the areas with risk of future hair loss were determined. Preoperative test transplantation sessions were performed in patients who were under 30 years of age or suspected to be non-stable clinically.

Hair transplantation: FUE method was used in all patients to perform hair transplantation. Anesthesia of donor and recipient regions was performed by using the same method that is used in hair transplantation treatment of AGA. Tumescence solution containing a lower amount of adrenaline (1/250.000) was used in these patients. Follicle extraction was performed by using punches 0.8-1.0 mm in diameter. Follicular units (FU) were first extracted with the help of a motor and they were collected by a forceps later on.

Canals 0.9-1.1 mm in width were opened in accordance with lateral slit technique by using small custom-made blades. Canal frequency was between 10 and 20 FU/cm². Direction and angle of the canals opened in hairy areas were similar to those of the patient's hairs. In hairless areas, canals were opened in a way that forms a natural hair growth direction. In lateral and posterior regions, canals were opened with steeper angles in comparison with canals opened in anterior and superior regions.

Patient care: Re-examination and first wash were performed 24 hours after the operation. All the patients were prescribed topical vasodilator minoxidil solution (Minoxil forte 5%®, DG Farma, Turkey) 15 days after the procedure for the purpose of obtaining an increase in blood circulation in the scar tissue to increase graft survival. The patients were followed up at regular intervals for the presence of graft re-growth, necrosis and other possible complications (erythema, itching, and dandruff).

Statistical Analysis

SPSS 20.0 for Windows program was used for statistical analysis. Descriptive statistics was presented as number and percentage for categorical variables, and mean, standard deviation, minimum, maximum for numerical variables.

Results

The median age of nine patients (3 females, 6 males) included in the study was 41 (minimum-maximum: 23-57) years. The median disease

duration was six (minimum-maximum: 3-12) years. The median stable period of the disease was two (minimum-maximum: 1-7) years. Histopathological diagnoses were LPP in four cases, FFA in two cases, pseudopelade in two cases, and folliculitis decalvans in the remaining case (Table 1). On dermatoscopic examination, scarred areas in patients with PCA were found to have no follicular openings. Bleeding test performed by using a 19G needle demonstrated a bleeding pattern similar to that in patients with non-cicatricial alopecia.

Preoperative test transplantation sessions were performed in three cases (two males, one female). Two of these patients (case 2 and case

4) were younger than 30 years old and medical history of one patient (case 8) revealed findings suggesting that the disease might not be in a stable phase (Table 2). In one patient (case 2), who underwent test session, new lesions appeared three months after test session and this patient was not transplanted as a result of activation and medical treatment was commenced for this patient.

The standard FUE technique was used for graft extraction and transplantation. The grafts were harvested from healthy regions. Hairline creation and frontal area transplantation were performed in addition to PCA treatment in one patient who had coexisting PCA and AGA (case 5).

Median 1250 (minimum-maximum: 500-2800) grafts were transplanted to each one of eight patients by using FUE technique. The patients were regularly followed up for a duration of median 26 (minimum-maximum: 11-43) months. Infection, necrosis or any other major complication were not observed following the procedure. Long lasting erythema was observed during the healing phase in only two patients.

Patient no	Gender	Age (years)	Histopathological diagnosis	Disease duration (years)	Stability (years)
1	M	41	Pseudopelad	9	7
2	F	25	Lichen planopilaris	4	1
3	M	42	Folliculitis decalvans	7	5
4	M	23	Lichen planopilaris	7	2
5	M	39	Lichen planopilaris and AGA	3	2
6	M	45	Pseudopelad	3	4
7	F	31	Frontal fibrosing alopecia	12	3
8	M	44	Lichen planopilaris	5	2
9	F	57	Frontal fibrosing alopecia	6	2

AGA: Androgenetic alopecia, F: Female, M: Male



Figure 1. The patient with LPP and AGA (case 5). After 2-years of stable period hair transplantation was performed by using a total of 1750 follicular units in his frontal, occipital and left temporal scarring areas. Preoperative (above) and postoperative (two years) views (below) of the patient. However, this patient relapsed in the donor and recipient areas after three years

Patient No	Test session	Total Graft Number	Side effect	Follow up duration (months)	Graft survival rate (%)	Alopecia closure rate (%)	Patient satisfaction	Reactivation
1	None	900	None	43	90	70-80	Very satisfied	None
2	Yes Reactivation	70 (test)	Reactivation	42	-	-	Not at all satisfied	Yes
3	None	670	None	42	90	70-80	Very satisfied	None
4	Yes	300 (test), 1600	None	18	90	70-80	Very satisfied	None
5	None	1750	Long lasting medium erythema	31	30	20	Not satisfied	Yes
6	None	1100	None	26	90	80	Very satisfied	None
7	None	1400	None	19	50	30	Not satisfied	None
8	Yes	416 (test), 2800 (1 st), 2650 (2 nd)	1 st session: long lasting light erythema	11	90	80	Very satisfied	None
9	None	500	None	13	70	80	Somewhat satisfied	None



Figure 2. The patient with pseudopelad (case 6). After 4-years of stable period hair transplantation was performed by using a total of 1100 follicular units in his temporal (bilaterally) and occipital scarring areas. Preoperative (above) and postoperative (10-months) views (below) of the patient



Figure 3. The patient with LPP (case 8). After 2-years of stable period hair transplantation was performed by using a total of 2800 follicular unit in his frontal, occipital and parietal scarring areas. Preoperative (above) and postoperative (11 months) views (below) of the patient

Only one patient out of eight transplanted patients experienced reactivation of the disease in both donor and recipient areas in postoperative second year. There was not any disease reactivation in seven transplanted patients and five patients were satisfied with the result of hair transplantation (Table 2) (Figures 1-4).

Discussion

The best surgical results can only be obtained in stable PCA, therefore, the stability of PCA is the most important parameter for a decision



Figure 4. The patient with FFA (case 9). After 2-years of stable period hair transplantation was performed by using a total of 500 follicular units on her both eyebrows. Preoperative (above) and postoperative (one year) views (below) of the patient

concerning surgical treatment⁶. There is no single clinical or laboratory parameter to provide definitive evidence that the disease will become stable and a new lesion will not develop. Generally accepted opinion with regard to disease stability relies on the declaration of the patient stating that any new lesions have not developed in a certain period of time. Hair transplantation is usually unsuccessful in patients who are not in the stable period. Different opinions have been presented in the literature on the question of minimum time period during which the disease should be stable before deciding any operation. Some authors recommended a 2-year disease-free period prior to surgery to minimize the risk of disease recurrence^{2,7,11}. Contrary to opinion of other authors Unger et al.^{5,6} have recommended that surgical therapies should be performed after a stable period of at least one year. In our series, only one patient underwent operation following one year of disease stability and the pre-operative stable period was two years or longer in the other patients. In the patient with one year stable period, activation was observed after three months following test transplantation. Therefore, we suggest that in addition to pre-operative detailed history taking and physical examination, a stable period of at least two years is essential before deciding on any surgical operation. Moreover, relying on declaration of the patient alone may be misleading to determine stable disease period as optimists and pessimists can perceive the stable period differently.

One important subject with regard to the surgical treatment of PCA is the selection of suitable candidates. In addition to disease stability,

it is important to determine whether the donor site contains enough number of hair follicles to cover the scarred area of the patient⁵. The outcome of surgical treatment will not meet the expectations of the patient if a good pre-operative evaluation is not performed. In such cases, narrowing scarred areas by using primary scar excision or use of alternative donor sites, if present, may be considered⁵. None of our cases underwent scar reduction for this purpose. The number of grafts obtained from donor sites was enough for the reconstruction of scarred areas in our cases. For patients with insufficient donor sites, hair systems or microfiber use are other alternative approaches⁶. Due to ideal donor-recipient area ratio resulting from availability of sufficient amount of donor hairs, hair transplantations were performed without any problem in all of our cases.

Pre-operative and intra-operative evaluation of scarred tissue is another important parameter in the selection of suitable candidates. Evaluation of scar circulation gives information on blood supply and determines graft viability and possible transplantation density⁵. In our study, we also assessed bleeding pattern in scarred tissues by using a 19G needle pre-operatively. This test demonstrated that circulation in scarred tissues was suitable for transplantation in all patients. It was observed that the scar tissue was neither atrophic nor hypertrophic while opening a canal in PCA patients. At the same time, it was observed that the skin was slightly hard as a result of fibrosis.

The FUE method has many advantages and is an accepted hair restoration technique all over the world¹². As this technique results in small wounds in the donor site, patients recover faster and experience less pain and discomfort following the procedure^{5,12}. We preferred to use FUE method in all of our patients (for both genders) with some technical differences. We created larger canals (0.9-1.1 mm) and obtained the hair follicles with a 0.8-1.0 mm punch in PCA patients. With this technical modification, graft damage was prevented during implantation of hair grafts into the scarred skin. Moreover, the blade was changed after every 200-300-canal opening in cicatricial alopecia patients (every 300-400 canal for AGA patients) as a result of presence of hard and fibrous scar. We think that FUT method may cause problems because this method results in a linear scar and available donor area is limited. Application of FUE method provides many benefits regarding ideal results and patient satisfaction. Due to the presence of widespread scars on the scalp of PCA patients, there is a limited healthy area for strip excision. It is also important not to create an additional scar by using strip excision method in this group of patients who have widespread scars. In recent years, the rate of achieving healthy hair grafts has increased as a result of growing experience with FUE method.

Another technical difference concerns the tumescent solution preparation method for the FUE technique. The solution for scarred tissue was prepared by using saline solution containing lower amount of adrenaline than the amount used in non-cicatricial alopecia treatment⁵. We used a tumescent solution containing lower amount (1/250.000) of adrenaline. We aimed at minimizing probability of circulatory impairment in scarred tissue by decreasing the amount of adrenaline. Adequate bleeding control could be achieved despite this lower dose.

Contrary to AGA or secondary cicatricial alopecia patients, long lasting erythema was observed in two patients (case 5 and case 8) in the

recipient area during the postoperative period. A two-year stable period was present in the medical history of both patients. This condition may be associated with a PCA disease process that is not inactive completely but disease activity is not high enough to create any follicular damage. However, the patient with postoperative long lasting moderate erythema (case 5) experienced reactivation of PCA in both donor and recipient areas two years following hair transplantation. The other case with postoperative long lasting slight erythema (case 8) was followed up for 11 months and he did not experience any relapse, but this follow up period may be short. This case did not show any reactivation six months after test session and 11 months following the first hair transplantation session. Thus, he had the second hair transplantation session as his alopecia area was too large for correction in a single session. In conclusion, a long lasting moderate or significant erythema may be a clinical indication of future relapse and this should be treated aggressively in the postoperative period.

In the two patients who experienced relapse a skin biopsy would have been helpful to show subclinical disease activity. It is possible that we induced Koebner phenomenon in these patients and their diseases were reactivated. However, there is no data on Koebnerization in PCA in the literature. We think that the primary reason for recurrence in these patients was disease instability and this was overlooked clinically. History, physical and dermatoscopic examinations do not seem to be enough to conclude that disease process is stable. There is a need for reliable clinical findings or tests to evaluate the stability of PCA prior to hair transplantation. These may be histopathological examination of biopsy specimens or serial photographic follow up of disease activity. We recommend skin biopsy especially for lymphocytic PCA cases prior to hair transplantation to check if the disease process is active or not. The aesthetic satisfaction of patients is correlated with realistic expectations of the patients. The treating surgeon should explain the disease, maximal achievable correction and risk of recurrence to PCA patients thoroughly. If the patient understands the limitations of hair transplantation concerning the treatment of cicatricial alopecia, he or she usually gets satisfaction from the procedure in the absence of any recurrence or surgical malpractice. Four patients were not satisfied with the result of hair transplantation performed for the treatment PCA in our study. Two of them (case 2 and case 5) experienced recurrence of PCA. The other two (case 7 and case 9) had FFA and an estimated 50-70% graft survival rate was achieved. Adequate alopecia closure rate was not achieved in case 7, but the other case achieved 80% closure rate after follow up periods of two years and one year, respectively. In the literature, there are two reports of test hair transplantation session in four patients with FFA^{8,9}. These cases showed promising results during a period of two years following hair transplantation but after two years, transplanted hairs were gradually lost as a result of FFA process^{8,9}. The authors concluded that the long-term outcome of hair transplantation performed to treat patients with FFA can be disappointing⁸. We also experienced lower alopecia closure and dissatisfaction from the procedure in our cases with FFA. In conclusion, it is not advised to perform hair transplantation for the treatment of FFA patients. Liu et al.¹⁰ reported FUE hair transplantation in two female patients with LPP and FFA. They reported that they achieved significant cosmetic improvement in these patients at the end of one year postoperatively and that this effect continued at an acceptable level after 3-4 years of follow-up. They reviewed the literature on hair transplantation for LPP

and FFA with variable results¹⁰. As far as hair transplantation results of neutrophilic PCA cases were concerned, alopecia closure and patient satisfaction were similar to those of secondary cicatricial alopecia cases, although they were small in number in our study. Lymphocytic PCA patients (2 LPP cases and 2 pseudopelade cases), excluding FFA and patients with recurrence of the disease (2 LPP cases), were satisfied well with the procedure. Acceptable graft survival and alopecia closure rates were obtained in those subsets of lymphocytic PCA cases.

Study Limitations

The limitations of our study may be its retrospective character, small number of patients and the fact that single surgeon performed hair transplantation. We encountered a few similar studies investigating hair transplantation in FFA and LPP cases in the literature⁸⁻¹⁰; our results are comparable to these published cases. As the number of cases is limited, there is a need for future studies to evaluate this subject in more detail.

Conclusion

Optimal long-term results can be achieved by using hair transplantation for the treatment of PCA patients with proper patient selection and correct surgical technique. FUE method of hair transplantation seems to be a successful and reliable method of choice for this group of patients.

Ethics

Ethics Committee Approval: The study does not require ethics committee approval because it is a retrospective case series evaluation involving a small number of cases.

Informed Consent: Written and verbal approvals have been obtained from the patients.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: E.C., Concept: E.C., A.A., B.A., M.E., Design: E.C., A.A., B.A., M.E., Data Collection or Processing: E.C., A.A.,

B.A., Analysis or Interpretation: E.C., A.A., B.A., Literature Search: A.A., B.A., Writing: A.A., B.A.

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