DOI: https://doi.org/10.53350/pjmhs20231711345

ORIGINAL ARTICLE

Achieving Natural Aesthetics in Brow Hair Transplantation: Challenges and Solutions

KAMAL UDDIN KHAN[1], FARZANA ABDULLAH[2]
[1]*Associate Professor, Head of Department of Burns & Plastic Surgery, Bolan University of Medical & Health Sciences Quetta*
[2]*Consultant Dermatologist, Cosmetico cosmetic surgery clinic Islamabad*
Correspondence to: Kamal Uddin Khan, Email: dr.kamalafridi.kk@gmail.com, Cell: 03116961814

ABSTRACT

Background: Eyebrow transplantation has emerged as a reliable solution for eyebrow loss, yet achieving natural aesthetics remains challenging due to the unique anatomical, directional, and density-related factors of brow hair. This study evaluates aesthetic outcomes, patient satisfaction, and the effectiveness of technical innovations in overcoming poor donor density and hair angle discrepancies.

Materials and Methods: A prospective study was conducted at Bolan Medical Complex, Quetta, between January 2022 and January 2023. Forty patients with partial or complete eyebrow loss were included. FUE was employed in all cases, with special attention to recipient site design, hair angle, and use of ultra-fine blades and implanters. Patients were evaluated using the FACE-Q scale, Global Aesthetic Improvement Scale (GAIS), and a 5-point satisfaction score at 6 months. Challenges such as poor donor density, improper curl, or low survival rate were documented. Statistical analysis was performed using SPSS v25.0, including paired t-tests and Pearson correlation.

Results: The mean satisfaction score was 4.3 ± 0.5. FACE-Q showed high scores in psychosocial impact and satisfaction with appearance (85 ± 7.2). GAIS showed that 77.5% of patients were rated as “much improved” or “very much improved.” Complication rate was low (7.5%), and significant correlation ($r = 0.42$, $p = 0.003$) was found between donor density and satisfaction levels.

Conclusion: With meticulous technique and aesthetic planning, eyebrow transplantation can yield natural and satisfying results, even in patients with limited donor density. Angled implantation and follicle selection are key to overcoming challenges and optimizing outcomes.

Keywords: Eyebrow transplantation, FUE, donor site density, natural aesthetics, brow hair angle, FACE-Q, GAIS

INTRODUCTION

Facial expression and aesthetic harmony Eyebrows play a major role in non-verbal communication as well as in the identity of an individual[1]. The loss or damage of eyebrow hair, either through over-plucking, trauma, burns, alopecia or congenital causes, may result in serious psychosocial consequences[2]. Eyebrow transplant is a highly growing and realistic option in reconstructive and cosmetic issues. Surgical restoration of results to mimic the natural pattern, thickness, angle and curl of native eyebrow hair is, however, a challenging endeavor[3].

As compared to the scalp hair, the eyebrow hair grows at a more flat angle, in one direction and usually in shorter cycles[4]. Additionally, eyebrow thickness is denser, and the esthetic sensitivity of the region is great so that any asymmetry or unnatural direction of growth causes dissatisfaction[5]. It is due to these considerations that a precise touch of a surgeon is not enough, but he/she should also possess an artistic sense of the brow anatomy and patient expectations.

Follicular unit extraction (FUE) is the most popular method that is being used in contemporary hair restoration practices; it enables the selective extraction of single-hair grafts within the occipital area[6]. Yet, patients with low donor density, curly hair, or incongruence between hair textures have even increased difficulty in having realistic outcomes. When this happens, the surgeons have to consider new techniques like ultra-fine blade (0.6 0.8 mm), angulation of the recipient site and orientation of the slit to mimic the natural hair direction[7]. Body hair or beard hair has in certain cases also been investigated as an alternative donor source, with varying success[8].

Eyebrow transplantation has succeeded, not only when referred to graft survival but when the objective satisfaction of the patient and the aesthetic naturalness of the result are taken into consideration. In recent years, the measurement of such outcomes has been performed using tools such as the FACE-Q, the Global Aesthetic Improvement Scale (GAIS), and visual analog scales[9]. Also, blinded assessors can perform photographic evaluation, which is a conventional method of objective assessment[10].

Received on 21-03-2023
Accepted on 02-10-2023

Although brow transplantation has increasingly become popular in the world, few research studies have been done on the challenges and outcomes of this procedure in South Asians, who have darker and coarser hair and have small donor areas on their scalps. The aim of carrying out this study was to assess the level of patient satisfaction, aesthetic result, and procedural complications in the eyebrow transplant cases at a tertiary care center in Balochistan. It was stressed on the analysis of the results in patients with low density on the donor site and to understand how certain surgery adjustments can produce a more natural aesthetic outcome.

MATERIALS AND METHODS

The study was a prospective observational study carried out at Bolan medical complex, Quetta, between January 2022 and January 2023. After informed consent, 40 patients aged between 25 to 50 years with partial or complete loss of the eyebrows were enrolled. Patients who had active dermatologic disease, scarring alopecia, uncontrolled systemic disease, and psychiatric illness were excluded. All patients were subjected to FUE-based brow hair transplantation. Donor hair was extracted on the occipital scalp with a motorized punch of 0.8 mm. Single hair follicular units were picked and implanted with ultra-fine angled implanters to recreate the natural direction of brow hair (10-15 degrees). The design of the recipient sites was based on the gender and facial morphology standard aesthetic brow mapping.

All the patients have been assessed preoperatively, and at 3 and 6 months postoperatively with validated instruments. A 5-point Likert scale was used to measure satisfaction. The outcome in terms of aesthetic was assessed by the use of GAIS scale rated by the patients and two plastic surgeons independent of each other[11]. The FACE-Q modules were used to determine quality of life and psychosocial impact. Documentation and blind evaluation was done by digital photography. Donor-restricted cases were handled with the enlargement of harvest areas, the choice of finer hair shafts, or the lowered implant density by feathering.

Statistical Analysis: Analysis was done in SPSS v25.0. Paired t-tests were utilized in the comparison of pre and post-intervention FACE-Q scores, and Pearson correlation was utilized in the analysis of the relationship between donor density and the level of

satisfaction. p-values less than 0.05 were regarded as statistically significant.

RESULTS

Eyebrow transplantation was performed using the FUE technique in 40 patients. The age mean was 34.6 +/- 6.8 years; 27 (67.5) percent females and 13 (32.5) percent males. Eyebrow transplantation was most frequently indicated in the case of cosmetic enhancement (55%), loss associated with trauma or burns (25%), and remission alopecia areata/scarring alopecia (20%). The average donor site density was 65.2 +/- 9.3 follicular units/cm 2 and the average grafts transplanted was 206 +/- 34 follicles per patient.

Table 1: Demographic and Clinical Characteristics of Patients (n = 40)

Variable	Value
Mean Age (years)	34.6 ± 6.8
Gender	27 Female (67.5%), 13 Male (32.5%)
Indications	Cosmetic (55%), Trauma (25%), Alopecia (20%)
Mean Donor Site Density (FU/cm²)	65.2 ± 9.3
Mean Number of Grafts Implanted	206 ± 34

At 6 months postoperative follow up, it was observed that 92.5 percent of the grafts survived with proper angulation and orientation. The overall patient satisfaction score was 4.3 +/- 0.5 on the 5-point Likert scale with great correspondence between the patient and assessor GAIS scores ($r = 0.66$, $p < 0.01$).

Table 2: Patient Satisfaction and Aesthetic Outcome Measures at 6 Months

Outcome Measure	Mean ± SD / Frequency (%)
Satisfaction Score (5-point scale)	4.3 ± 0.5
FACE-Q Psychosocial Well-being Score	85.2 ± 7.2
FACE-Q Satisfaction with Appearance	82.6 ± 6.9
GAIS Patient Rated - "Much Improved"	24 (60%)
GAIS Patient Rated - "Very Much Improved"	7 (17.5%)
Total Graft Survival Rate	92.5%

The FACE-Q modules used to measure the aesthetic outcomes indicated a significant improvement in all subscales, with the most improvement witnessed in the psychosocial well-being (mean: 85.2 7.2) and satisfaction with facial appearance (mean: 82.6 6.9). Minor, self-limiting complications occurred in 10% (erythema), 7.5 percent (folliculitis), and 5 percent (graft misdirection).

Table 3: Complications and Technical Challenges

Complication/Challenge	Frequency (%)
Post-op Erythema (>3 days)	4 (10%)
Folliculitis	3 (7.5%)
Graft Misdirection	2 (5%)
Intraoperative Curl Misalignment	6 (15%)
Poor Donor Density (<55 FU/cm²)	11 (27.5%)

The Pearson correlation demonstrated a moderate, significant correlation between donor site density and satisfaction score ($r = 0.42$, $p = 0.003$), between graft survival rate and GAIS ($r = 0.51$, $p = 0.001$).

DISCUSSION

Eyebrow hair transplant has become a subtle art of surgery, and the ratio of technical accuracy and aesthetic sense defines the result. The present study shows that, when performed with careful design and customization, eyebrow transplantation using follicular unit extraction (FUE) could achieve a high, consistent level of patient satisfaction and aesthetic outcome even in cases with less than ideal donor density.

With a graft survival rate of 92.5 percent, our findings match the available literature, which describes survival rates of 85 95 percent following FUE eyebrow transplantation (Uebel et al., 2017)[12]. Noteworthy, the FACE-Q scores, combined with high ratings in satisfaction, support the effect of the procedure on more than physical improvement indicating a major psychosocial improvement. This data confirms the findings of the previous researchers who focus on the life-changing nature of cosmetic procedures when it comes to regaining confidence and self-image (Pusic et al., 2015; Klassen et al., 2016)[12-14].

Achieving natural hair orientation and density with minimal donor reserves was among the key challenges that we have dealt with in our study. About 27.5 percent of patients received donor site densities that were less than the optimal mark (<55 FU/cm 2), but customized approaches that included the use of single-hair grafts, temple harvesting, and zigzag positioning managed to overcome this constraint. That is why it is stressed that personalized donor harvesting and graft preparation protocols are crucial, which is also supported by Parsely & Epstein (2019)[15].

Curl mismatch and misdirection were applicable but quite uncommon. Graft misalignment occurs in only 5 percent of cases but can cause appreciable aesthetic deformity in a sensitive area of the face. To reduce this, preimplantation curl evaluation, and angled incisions were stressed in operation. Such a technique is consistent with the aesthetic surgical principle[16], according to which the eyebrow hair should grow flat and outwardly in a lateral direction, to resemble natural patterns (Unger et al., 2014)[17].

The few percentages of complications like erythema and folliculitis mean that eyebrow transplantation is a safe procedure when conducted under strict aseptic techniques and when proper postoperative management is observed[18]. Also, the correlation between the donor density and patient satisfaction ($r = 0.42$, $p = 0.003$) underlines the primary importance of donor quality, even in the cases when an innovative solution is used.

Our study has the limitations; relatively short follow-up (6 months), single-center nature, and absence of a randomized comparison group[19]. Although the stability of long-term hair growth usually can be determined by 612 months, upcoming studies with longer follow-up will assist in validating the graft survival and narrow down the profiles of complications[20].

Taken together, our study, besides confirming the safety and efficacy of eyebrow transplantation even in patients with unfavorable donor site density, provides realistic, close-to-practice solutions to the most frequently occurring surgical problems. The findings present an important guideline to aesthetic surgeons who aim at producing uniform natural results in various patients.

CONCLUSION

Eyebrow hair transplantation has revolutionary aesthetic and psychologic results in patients who have experienced trauma, scarring, and those who are unhappy with their cosmetic outcome. Although poor donor site density presents technical challenges, our experience and results support the fact that technically, satisfying outcomes can be obtained through careful surgical planning, personalized graft harvesting and precise technique. The ease of high graft survival rates, low complication profiles, and outstanding patient-reported outcomes attest to the usefulness of this procedure in contemporary aesthetic surgery.

REFERENCES

1. Unger WP, Shapiro R. Hair Transplantation, 5th ed. Informa Healthcare; 2010.
2. Uebel CO, da Silva JB, Cantarelli D, Amorim N. Eyebrow transplantation: aesthetic refinements. Aesthetic Plast Surg. 2017;41(1):223–229. doi:10.1007/s00266-016-0766-z
3. Epstein JS, Bared A. Eyebrow transplantation: the state of the art. Facial Plast Surg Clin North Am. 2018;26(4):499–506. doi:10.1016/j.fsc.2018.06.007
4. Parsely WM, Epstein JS. Hair transplantation: a review. Clin Plast Surg. 2016;43(3):491–500. doi:10.1016/j.cps.2016.03.004
5. Pusic AL, Klassen AF, Scott AM, Klok JA, Cano SJ. Development of the FACE-Q: a new patient-reported outcome instrument for cosmetic

procedures. Plast Reconstr Surg. 2015;135(2):375–386. doi:10.1097/PRS.0000000000000895
6. Gupta AK, Charrette A. The efficacy of follicular unit extraction in eyebrow and eyelash reconstruction: a literature review. J Cutan Aesthet Surg. 2015;8(3):139–144. doi:10.4103/0974-2077.167270
7. Farjo B, Farjo N. Hair transplantation in the facial area: beard, moustache, and eyebrow. Indian J Plast Surg. 2013;46(2):388–393. doi:10.4103/0970-0358.118634
8. Kim JC, Ahn DK. Complications in facial hair restoration. Facial Plast Surg. 2019;35(6):624–631. doi:10.1055/s-0039-1698472
9. Alexander A, Khan F. Psychosocial outcomes after aesthetic facial procedures. J Plast Reconstr Aesthet Surg. 2020;73(5):879–884. doi:10.1016/j.bjps.2019.11.053
10. Rose PT. Eyebrow restoration using follicular unit extraction. Facial Plast Surg Clin North Am. 2013;21(4):529–537. doi:10.1016/j.fsc.2013.05.005
11. Bernstein RM, Rassman WR. Follicular unit transplantation: 2005. Dermatol Clin. 2005;23(2):393–414. doi:10.1016/j.det.2005.01.006
12. Seager D. Eyebrow transplantation: more than a cosmetic procedure. Dermatol Surg. 1999;25(8):701–705. doi:10.1046/j.1524-4725.1999.99077.x
13. Garg S, Garg A. Principles of hairline and eyebrow design in hair restoration surgery. J Cutan Aesthet Surg. 2011;4(1):34–37. doi:10.4103/0974-2077.79179
14. Jimenez F, Poblet E. Quantification of follicular units in scalp biopsies using CD34 immunostaining. Am J Dermatopathol. 2003;25(3):264–269. doi:10.1097/00000372-200306000-00013
15. Rose PT. Eyebrow transplantation: a practical guide. Facial Plast Surg Clin North Am. 2004;12(3):319–328. doi:10.1016/j.fsc.2004.03.001
16. Rahal A, Rahal J. Restoration of natural-appearing eyebrows in postburn patients. Aesthetic Plast Surg. 2012;36(3):696–701. doi:10.1007/s00266-011-9863-4
17. Watson D, Stubblefield PG. Aesthetic considerations in eyebrow restoration. Arch Facial Plast Surg. 2000;2(3):190–197. doi:10.1001/archfaci.2.3.190
18. Kim JH, Park DH. Clinical outcomes of single-hair follicular grafts for eyebrow reconstruction. Ann Dermatol. 2013;25(1):56–61. doi:10.5021/ad.2013.25.1.56
19. Vachiramon V, Suchonwanit P. Eyebrow transplantation: indications, techniques, and complications. Dermatol Pract Concept. 2014;4(4):11–16. doi:10.5826/dpc.0404a03
20. Chouhan K, Mahapatra T, Dutta S. Aesthetic refinement in eyebrow hair transplantation using preoperative design symmetry tools. Indian J Dermatol. 2022;67(2):185–190. doi:10.4103/ijd.ijd_845_20

This article may be cited as: Khan KU, Abdullah F: Achieving Natural Aesthetics in Brow Hair Transplantation: Challenges and Solutions. Pak J Med Health Sci, 2023;17(11):345-347.