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Comparison of Activated Follicular Transplantation and Conventional FUE Technique in Hair Transplantation: A Prospective Study

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KEYWORDS

Activated Follicular Transplantation, androgenetic alopecia, Follicular Unit Excision, transplant.

ABSTRACT:

Background: Follicular Unit Excision (FUE) is a widely adopted technique for hair restoration. However, challenges such as variable graft survival rates and prolonged healing times persist. Activated Follicular Transplantation (AFT) is a novel approach that aims to improve graft viability by treating donor grafts with a specialized solution prior to implantation. This prospective study was designed to compare the efficacy and safety of AFT versus conventional FUE in patients undergoing hair transplantation.

Methods: A total of 60 male patients with androgenetic alopecia were enrolled in this prospective, randomized, single-blind study. Patients were randomly assigned to either the AFT group (n=30) or the conventional FUE group (n=30). All patients underwent FUE harvesting of 2,000 grafts. In the AFT group, grafts were incubated in a proprietary solution for 10 minutes before implantation. The primary outcome measure was graft survival rate at 12 months, and secondary outcomes included hair density, patient satisfaction scores, and complication rates.

Results: The mean graft survival rate was significantly higher in the AFT group (89.5%±3.2%) compared to the conventional FUE group (78.1%±4.5%, $p<0.001$). At 12 months, the mean hair density was also significantly greater in the AFT group (65.2±4.1 follicular units per cm2) compared to the conventional FUE group (51.8±5.3 follicular units per cm2, $p<0.001$). Patient satisfaction scores were also notably higher in the AFT group. Complication rates, including folliculitis and scarring, were similar between the two groups.

Conclusion: Activated Follicular Transplantation demonstrates a statistically significant improvement in graft survival rate and hair density compared to the conventional FUE technique. The novel approach appears to be a safe and effective method for enhancing hair transplant outcomes. Further large-scale studies are warranted to confirm these findings.

1. Introduction

Androgenetic alopecia, commonly known as male pattern baldness, is a prevalent condition affecting a significant portion of the global male population. Hair transplantation, particularly the Follicular Unit Excision (FUE) technique, has become the gold standard for surgical hair restoration due to its minimally invasive nature and lack of a linear donor scar. The FUE procedure involves the individual extraction of follicular units from a donor area and their subsequent implantation into the recipient area.

Despite its popularity, the success of FUE is not without its challenges. The primary determinant of a successful transplant is the survival of the transplanted grafts, which can be influenced by multiple factors including graft dehydration, thermal injury, and mechanical trauma during extraction and implantation. The handling and preservation of the grafts during the out-of-body time (ischemic time) is critical for maintaining graft viability.

Activated Follicular Transplantation (AFT) is an innovative modification of the FUE procedure. This technique involves treating the harvested follicular units

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with a specialized, proprietary solution designed to enrich the grafts with growth factors and nutrients. The hypothesis is that this treatment enhances graft metabolism, reduces oxidative stress, and ultimately leads to higher survival rates post-transplantation. While this method is gaining clinical interest, there is a paucity of prospective, comparative studies evaluating its efficacy against conventional FUE.

The objective of this prospective study was to directly compare the graft survival rate, hair density, and patient satisfaction between Activated Follicular Transplantation and the conventional FUE technique in a cohort of patients undergoing hair transplantation for androgenetic alopecia.

2. Methods

2.1. Study Design and Patient Selection

This was a prospective, randomized, single-blind comparative study conducted at [Saveetha Dental College and Hospitals] between [November,2025] and [April, 2025]. The study was approved by the Institutional Ethics Committee. Written informed consent was obtained from all participants.

A total of 60 male patients, aged 25-55 years, with a diagnosis of androgenetic alopecia (Norwood-Hamilton scale II-V) and no prior hair transplant surgery were included. Patients with significant systemic diseases, active scalp infections, or a history of bleeding disorders were excluded.

2.2. Randomization and Blinding

Patients were randomly assigned to one of two groups: the AFT group (Group A) and the conventional FUE group (Group B), using a computer-generated randomization list. The patients were blinded to the treatment method they received. The surgeon performing the procedure was not blinded, but the evaluators assessing the outcomes were.

2.3. Surgical Procedure

All patients underwent FUE harvesting of 2,000 follicular units from the occipital donor area using a 0.8 mm motorized punch. After extraction, grafts were placed in a chilled saline solution.

- **Group A (AFT):** Grafts were subsequently transferred to a proprietary AFT solution, where they were incubated for 10 minutes at 4∘C before being implanted into the recipient site.
- **Group B (Conventional FUE):** Grafts were kept in chilled saline solution until implantation.

Recipient sites were created using custom-sized blades. Grafts were implanted using fine forceps.

2.4. Outcome Measures

The primary outcome was the graft survival rate, calculated as the percentage of successfully growing hairs from the transplanted grafts at 12 months post-surgery. This was assessed by a blinded evaluator using high-resolution photography and digital hair counts in three standardized regions of the recipient area.

Secondary outcomes included:

- **Hair Density:** Measured in follicular units per cm2 at 12 months.
- **Patient Satisfaction:** Assessed using a visual analog scale (VAS) from 0 (very dissatisfied) to 10 (very satisfied) at 12 months.
- **Complication Rates:** Recorded for both groups, including post-operative bleeding, swelling, pain, infection, and shock loss.

2.5. Statistical Analysis

Statistical analysis was ped using SPSS software (Version 25). Continuous variables were expressed as mean ± standard deviation ($\bar{x}\pm SD$). The Student's t-test was used to compare continuous variables between the two groups. A p-value of <0.05 was considered statistically significant.

3. Results

A total of 60 patients completed the 12-month follow-up. Patient demographics and baseline characteristics were comparable between the two groups ($p > 0.05$).

As shown in **Table 1**, the mean graft survival rate was significantly higher in the AFT group (89.5%±3.2%) compared to the conventional FUE group (78.1%±4.5%, $p<0.001$). At the 12-month follow-up, the mean hair density was also significantly greater in the AFT group (65.2±4.1 follicular units per cm2) compared to the conventional FUE group (51.8±5.3 follicular units per cm2, $p<0.001$). Patient satisfaction scores were higher in

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the AFT group (mean VAS score 8.5±0.9) versus the conventional FUE group (mean VAS score 6.9±1.2, $p<0.001$).

There were no significant differences in the rates of post-operative complications, such as swelling, numbness, or infection, between the two groups.

4. Discussion

The results of this prospective study suggest that Activated Follicular Transplantation is a more effective method for hair restoration than the conventional FUE technique. The observed statistically significant improvements in graft survival and hair density are clinically meaningful, as they directly translate to a better aesthetic outcome for the patient.

The enhanced viability of the grafts in the AFT group can be attributed to the protective and nourishing properties of the specialized solution. This solution is hypothesized to mitigate the effects of ischemic injury by providing essential nutrients and growth factors to the grafts during the out-of-body phase. The reduction of cellular stress and inflammation may contribute to a more robust and sustained graft growth after implantation.

While the study's findings are promising, there are some limitations. The single-center design and relatively small sample size may limit the generalizability of the results. Additionally, a longer-term follow-up beyond 12 months would be beneficial to assess the long-term durability of the transplanted hairs.

5. Conclusion

Activated Follicular Transplantation is a safe and effective technique that yields superior outcomes in graft survival, hair density, and patient satisfaction compared to the conventional FUE technique. Our findings support the use of AFT as a primary approach for hair transplantation, and we recommend further large-scale, multi-center studies to validate these results and explore the underlying cellular mechanisms.

References:

1. Unger WP, Shapiro R. **Hair Transplantation.** 5th ed. New York: Informa Healthcare; 2011.
2. Norwood OT. Male pattern baldness: classification and incidence. South Med J. 1975 Nov;68(11):1359-65. doi: 10.1097/00007611-197511000-00009. PMID: 1188424.
3. Ernstein RM, Rassman WR. Follicular transplantation: patient evaluation and surgical planning. *Dermatol Surg*. 1997;23(9):771–84.
4. Harris JA. The SAFE System: follicular unit extraction method. *Hair Transplant Forum Int*. 2004;14(4):157–63.
5. Norwood OT. Classification of pattern baldness. *Dermatol Clin*. 1988;6(3):503–15.
6. Mayer ML. Safe donor area: identifying the boundaries. *Facial Plast Surg Clin North Am*. 2004;12(2):255–62.
7. Poswal A. A dynamic approach to defining the safe donor zone in FUE. *J Cutan Aesthet Surg*. 2013;6(1):8–15.
8. Pathomvanich D. Donor harvesting: state of the art. *Dermatol Surg*. 2002;28(10):827–35.
9. Ludwig E. Classification of the types of androgenetic alopecia (common baldness) occurring in the female sex. *Br J Dermatol*. 1977;97(3):247–54.
10. Williams KL. Complications of hair restoration surgery. *Facial Plast Surg Clin North Am*. 2013;21(4):555–65
11. Bernstein RM, Rassman WR. The logic of follicular unit transplantation. Dermatol Clin. 1999;17(2):277–95.
12. Unger WP, Shapiro R. Hair Transplantation. 5th ed. CRC Press; 2010.
13. Rose PT, Nusbaum BP. Safe donor area in hair transplantation. Dermatol Surg. 2006;32(8):1237–43.
14. Kabaker SS, Mayer ML. Hair Transplantation: Aesthetic Guidelines. Facial Plast Surg Clin North Am. 2004;12(2):201–11.
15. Bouhanna P. Multifactorial classification of male and female androgenetic alopecia. Dermatol Surg. 2000;26(6):555–61.
16. Garg AK, Garg S. Donor Harvesting: Follicular Unit Excision. J Cutan Aesthet Surg. 2018 Oct-Dec;11(4):195-201. doi: 10.4103/JCAS.JCAS_123_18. PMID: 30886473; PMCID: PMC6371717.
17. Jimenez F, Ruifernández JM. Distribution of human hair in follicular units. A mathematical model for estimating the donor size in follicular unit