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Original Article

Follicular unit transplantation for male pattern baldness: evaluation of first 250 cases

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Abstract

Objective To restore hair, making the scalp look natural, by using follicular unit transplantation technique.

Patients and methods Hair transplantation surgeries were performed on consecutive 250 patients between the ages of 24-69 years by 'follicular unit transplantation (FUT)' method from January, 2006. Patterns were classified according to the age group. All the procedures were done under local anesthesia as an outpatient procedure. A small strip of scalp containing hair with dimensions of 15-20cm x 1.5-2.1cm was excised from the occipital regions with the patient in prone position. The donor area was closed primarily using a non-absorbable 3-0 material with lower edge trichophytic closure technique. The hair-bearing strip was dissected into units containing clusters of one, two, three, and four follicles, under magnification. The anterior hairline was drawn preoperatively on each patient. Implantation of the follicular units was initiated immediately after the slits formation. A minimum of 1500 and maximum of 3235 follicular units were placed in one session. Transplanted areas were left open without any dressing. The donor area was covered with a small dressing which was removed the next morning. The first washing was started after 48 hours. The donor area stitches were removed after 10-12 days.

Results The mean age of the patients was 36.6 years. Majority of the patients (65.2%) were in 21-35 years age group. 28% of the patients belonged to type V of Norwood classification. The transplanted hair entered into the 'telogen' phase and were lost within 2-4 weeks. The regrowth started in the third month, but it varied from patient to patient. The results were achieved in 8-9 months. No hematoma, infection or necrosis was observed in the early postoperative period. Mild periorbital edema was observed in 9 patients only, however, it disappeared in the first week. Two patients displayed the inclusion cysts which were managed by drainage and, topical and oral antibiotics.

Conclusion Good planning, carefully prepared follicular units, and careful placement provide results that was satisfying for both the surgeon and the patient.

Key words
Follicular unit, hair transplantation, male-pattern baldness, androgenetic alopecia, follicular unit transplantation

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Introduction

The first hair transplants were performed by Dieffenbach in 1822.[1] In 1939, a Japanese dermatologist Okuda placed skin grafts containing hair follicles, on scarred areas of burn victims.[2] The use of single hair grafts was

initially reported by another Japanese dermatologist, Tamura, who used 1-2 hair roots to restore female pubic area.[3] In late 1950's Orenterich's grafting techniques established the foundation on which modern hair transplant technique is based.[4] Initially, 4 mm punches were used. But in 1980's Nordstorm and Marritt introduced the use of single hair grafts to improve frontal hair line as an attempt to provide a natural appearance.[5,6]

The *'micrograft'* contains two or three hair while the *'minigrafts'* contain three to six hair. These may be *'small minigrafts'* containing three to four hairs, and *'large minigrafts'* containing five to six hairs. *'Punch grafts'* contain bunches of eight to ten hairs. These are obsolete nowadays.[7] The term 'follicular unit' was defined by Headington in 1984.[8] In 1994, Limmer defined a technique by which he lifted the donor area in the form of a long ellipse, and harvested a few hair follicles without harming the roots.[9] In 1995, Bernstein and Rassman explained the details of their procedure and thus the term 'follicular unit' was introduced to modern hair surgery.[10] The name of the procedure was changed to 'follicular unit transplantation (FUT)' in 1998. Follicular units are prepared under magnification by isolation of natural hair clusters of 1-3 follicles. The epithelium and the extra tissue are removed as much as possible, so that the grafts can be placed more densely because of smaller graft size.

In this study, the successful experience of follicular hair transplantation is mentioned.

Patients and methods

Hair transplantation was performed on consecutive 250 patients between the ages of 24-69 years by follicular unit transplantation (FUT) method from January 2006 onwards. Patterns were classified according to the age group and Norwood scale. The density of donor area, the bald zone and the contrast between the hair and scalp were all taken into consideration.

Operative technique

All the procedures were performed under local anesthesia as an outpatients procedure. The patients were given a single preoperative dose of oral sedative (diazepam 10 mg) and first generation cephalosporin (cephradine 500mg). The donor area was marked. A solution of 1% xylocaine with 1:100,000 adrenaline was infiltrated into the subcutaneous regions of occipital nerve in the donor area. A small strip of scalp containing hair with dimensions of 16-27cm x 1.5-2.1cm was excised from the occipital regions with the patients in prone position. The donor area was closed primarily using a non-absorbable 3-0 polypropylene suture with lower edge trichophytic closure technique. The hair bearing strip was dissected into follicular units containing clusters of one, two, three and four follicles under magnification (**Figure 1**).

Creation of the anterior hairline

The anterior hairline was drawn preoperatively on each patient. The mid-point distance was kept 7-9 cm. The hairline design was drawn according to skull shape, pattern of baldness, hair style, and age. To avoid line effect, a transition zone was marked (**Figure 2**). The distribution of the number of follicular units was also marked.

Preparation of the recipient area

The recipient area was infiltrated with a solution of normal saline, 1% xylocaine and 0.5 mg of epinephrine. This solution provided widening and stretching of the surface area. Slits were made according to the preoperative plan.

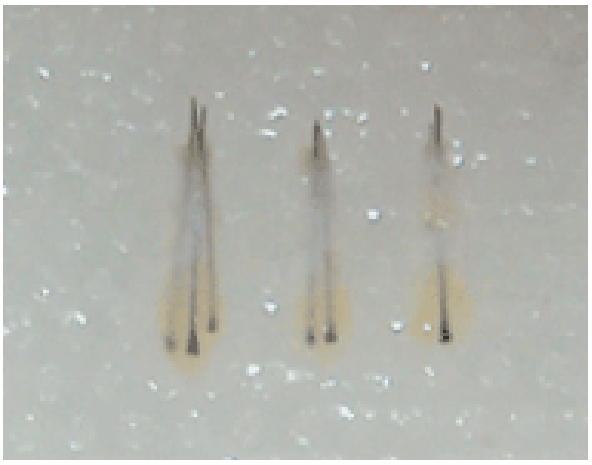

Figure 1 Follicular unit grafts/

Figure 3 Transition zone.

Implantation of the follicular units was initiated immediately after slits formation. The follicular grafts were not allowed to be dry any time during the whole procedure. Two implanters were operating simultaneously. The duration of the surgery was 5-7 hours depending on the number of grafts and quality of the skin. The single follicular units were placed in the anterior hairline while two, three and four grafts units were placed at the back. A minimum of 1500 and maximum of 3235 grafts were placed in one session.

Table 1 Ages of the patients and severity of alopecia according to Norwood classification(n=250)

Age group (years)	*N (%)*
21 – 25	38 (15.2)
26 – 30	65 (26.0)
31 – 35	60 (24.0)
36 – 40	41 (16.4)
41 – 50	31 (5.2)
> 51	15 (6.0)
Type	***N (%)***
II	9 (3.6)
III	21 (8.4)
IV	50 (20.0)
V	70 (28.0)
VI	61 (24.4)
VII	39 (15.6)

After care

Transplanted areas were left open without and dressing. The donor area was covered with a small dressing which was removed the next day morning. The first washing was started after 48 hours. The donor area stitches were removed on 10^{th}-12^{th} day.

Results

The mean age of the patients was 36.6 years. Majority of the patients (65.2%) were 21-35 years age group (**Table 1**). 28% of the patients belonged to type V of Norwood classification (**Table 1**). The transplanted hair entered into the 'telogen' phase and were lost within 2-4 weeks. The regrowth was started in the third month, but it varied from patient to patient. The results were achieved in 8-9 months. No hematoma, infection or necrosis was observed in the early postoperative period. Mild periorbital edema was observed in 9 patients only, however, it disappeared in the first week. Two patients displayed the inclusion cysts which were managed by drainage and, topical and oral antibiotics. None of the patients complained of a prominent unnatural anterior hairline or unnatural angles of the hair. The patients were

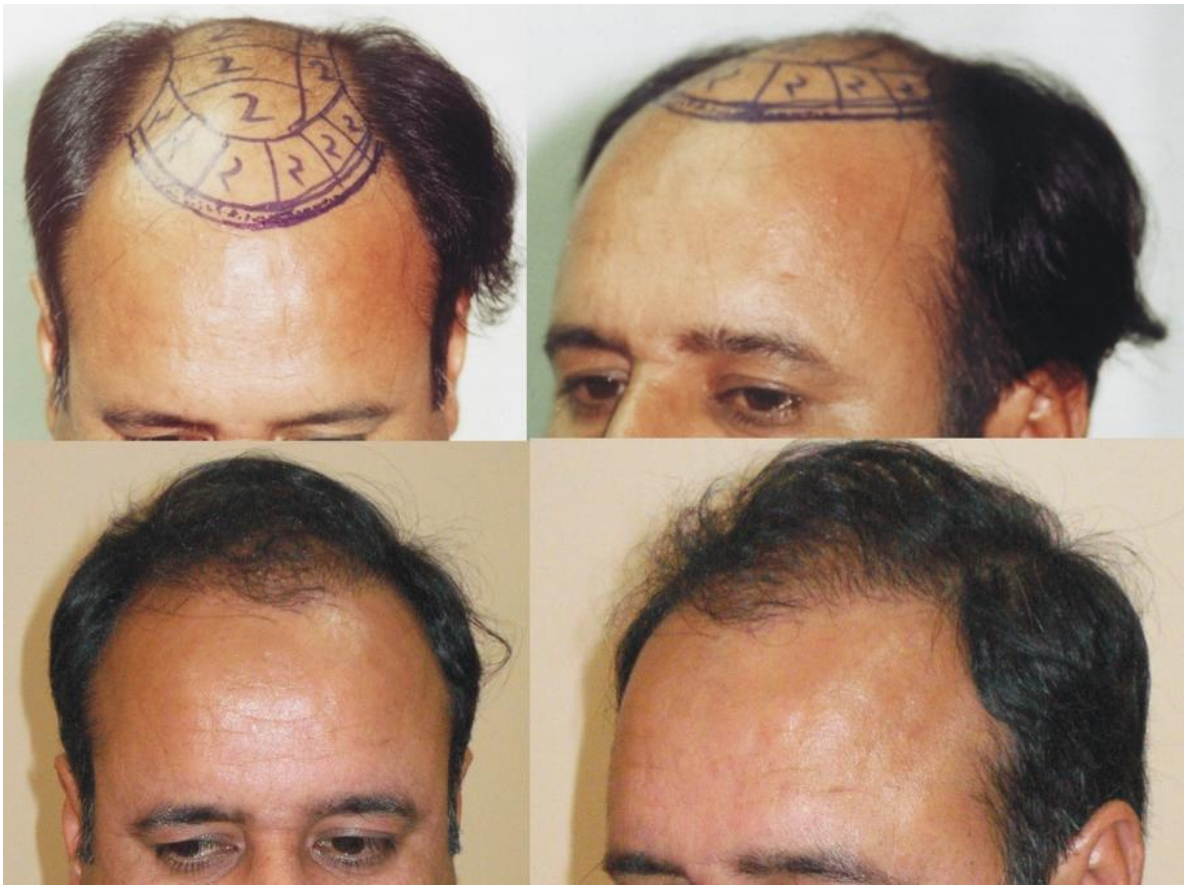

Figure 4 In a patient with type 5 androgenetic alopecia, preoperative and postoperative photographs.

satisfied with the anterior hairline, direction of hair growth, density and naturalness (**Figures 3**). The donor scar ranged between 1-2 mm in 98% patients whereas only 2% patients had a 3mm wide scar.

Discussion

Although many surgeons use the micro/mini graft methods, but the advantages of FUT have been highlighted in various reports when compared with micro/minigraft transplantations.[10,11] In FUT, follicular units are prepared under magnification. This allows denser placement of grafts and thus provides a more natural look. The most important point remains the proper preoperative planning in individual cases. Various anterior hairline patterns are mentioned in the literature.[12,13] But the hairline should be designed on individual basis depending on patient's age, skull and hair characteristics, baldness pattern, forehead structure of the patient, texture and status of patient's existing hair. All these patient's specifications were taken into consideration. The aim of hair transplant surgery was to remake a natural anterior hairline with coverage in first session and density in the second session. The distance between the middle of the anterior hairline and glabella is recommended to be 8-9cm. However, it was lowered in the patients who had narrow forehead, reducing it to 7cm. The anterior hairline was irregular yet with a certain arrangement in itself.

The second most important point was the angle of the slits which was kept to a narrow angle (even < 20-30^{o}). The naturalness of the anterior hairline was the key point, thus placing only single follicular units. The angles changed as the

slits progressed posteriorly, but again the normal angles. A critical landmark in mature male hairline is the frontotemporal recession. This landmark is formed by the emergence of two convex lines making up the frontal and temporal hairlines and it should never be violated. Maintenance of this landmark in hair transplantation avoids the unnatural, straight-line, doll-hair effect. Moreover, the anterior hairline appears more natural if it runs parallel to the ground when seen in a lateral profile view.

Another important point is the donor area scar. Many dissecting techniques are described in the literature.[14-16] But the main issue remains the proper placement of the resultant scar and most importantly, a tension-free closure. In cases where there was tension, a fine supragaleal dissection helped in proper closure and resulted in a fine scar (**Figures 3**).

The main activity performed in hair transplantation is camouflage. Good planning and careful patient evaluation prior to the procedure is of the utmost importance. The patient's specifications should be understood and discussed thoroughly in the preoperative consultation. Caution should be observed in patients having high expectations.

Conclusion

Good planning, carefully prepared follicular units, and careful placement provide results that was satisfying for both the surgeon and the patient.

References

1. Dieffenbach JF. Nonnulla de regeneratione et transplantatione. *Dissetation Inauguralis* 1822.
2. Bertucci V, Berg D, Pollack SV. Hair transplantation update. *J Cut Med Surg* 1998; **2**: 180-6.
3. Tamura H. Pubic hair transplantation. *Jpn J Dermatol* 1943; **53**: 73-5.
4. Orentreich N. Autografts in alopecias and other selected dermatological condition s. *Ann NY Acad Sci* 1959; **84**: 463-9.
5. Nordstorm REA. Micrografts for improvement of the frontal hairline after hair transplantation. *Asthetic Plast Surg* 1981; **5**: 97-9.
6. Marritt E. Single hair transplantation for hairline refinement: a practical solution. *J Dermatol Surg Oncol* 1984; **10**: 962-6.
7. Unger MG, Cotterill PC. Hair transplantation. In: Guyuron B, editor. *Plastic Surgery, Indications, Operations, and Outcomes*. Louis: Mosby; 2000. P. 2487-2504.
8. Headington JT. Transverse microscopic anatomy of the human scalp. *Arch Dermatol* 1984; **20**: 449-56.
9. Limmer BL. Elliptical donor stereoscopically assisted micrografting as an approach to further refinement in hair transplantation. *Dermatol Surg* 1994; **20**: 789-93.
10. Bernstein RM, Rassman WR. The aesthetics of follicular transplantation. *Dermatol Surg* 1997; **23**: 785-99.
11. Berrera A. The use of micrografts and minigrafts in the aesthetic reconstruction of the face and scalp. *Plast Reconstr Surg* 2003; **112**: 883-90.
12. Shapiro R. Principles and techniques used to create a natural hairline in surgical hair restoration. *Facial Plast Surg Clin North Am* 2004; **12**: 201-17.
13. Martinik JH. Hairline placement: getting it right the first time. *Hair Transplant Forum Intrnl* 1999; **9**: 65-71.
14. Camarena AS. Triple S donor harvesting. *ESHRS J* 2001; **1**: 6-7.
15. Ziering C, Lin R, Calder J. The Ziering tunnel technique: a new technique for reducing donor closure tension in hair transplant surgery. *ESHRS J* 2001; **1**: 10-12.
16. Frechet P. Scalp surgery with invisible scars. *ESHRS J* 2005; **5**: 10-11.