



Review Article

Hair Transplantation: An Art of Hope – A Review Article

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Abstract

Hair transplantation field in maxillofacial surgery has become a topic of issues and controversies owing to the unforeseen complications associated with general dental practice. Controversy exists between OMFS and Plastic surgeons for the authority of the procedure. Patient selection is the key, as required in most cosmetic procedures. This review article deals with basics in hair transplant, anatomy and prognosis.

Keywords: Alopecia, Hair Loss, Follicle

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INTRODUCTION

Scalp hair represents health, vigour, vitality, and strength in both males and females and is resistant to extremes of nature. Thus, loss of hair has been attributed to many psychological implications, especially in an era of aesthetic conventions. Hair transplantation in recent years have gained much acceptance and is widely practiced by oral and maxillofacial surgeons in India. This is a procedure in which hair is transplanted from donor site to the sites of hair loss. Surgical hair restoration began with “plug grafts” with 20-30 hairs each, which left a social stigma due to unnatural appearance [1]. Recent techniques such as follicular unit transplantation by mega sessions and follicular unit excision, has brought about much acceptance of this procedure.

Surgical anatomy

The total number of scalp hair is normally 100,000. Hair grows at the rate of 1–2 cm every month. 40–100 hairs are shed daily approximately. This rate increases in late summer and early autumn, and decreases in late winter or early spring [2].

Hair arises from the scalp, from a follicle consisting of epidermis that has invaginated the dermis. Hair is the product of interaction and communication between dermis and epidermis. Anatomically consists of three parts; The bulb, which extends from the base of the follicle to the insertion of the arrector pili muscle. The isthmus, which extends from the to the insertion of the arrector pili muscle to the sebaceous duct. The infundibulum, which runs from the insertion of the entrance of the sebaceous duct to the follicular ostium.

Hair has continuous turnover throughout life [3]. Hair follicles are replaced periodically. Three stages of their growth cycle: Anagen phase: The actively growing stage (2-4 years), Catagen phase (involution stage): brief period of morphological change and Telogen phase: resting phase or shedding phase (100 days).

Follicular unit

One follicular unit has between 1 and 5 terminal hair follicles, associated sebaceous lobules, 1 or 2 vellus follicles, insertion of erector pili muscle, neurovascular bundle and collagen. Transplanting 25 follicular units per square centimeter will provide density more than 50 hair/cm² which can provide good optical aesthetics. Each follicular unit will contain an average of 2.3 hairs [Figures 1,2].

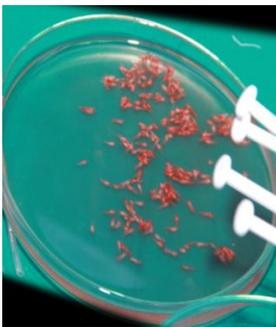


Figure 1. Follicular units



Figure 2. Follicular units

Etiology of hair loss have been described in literature: MAGA or male pattern androgenic alopecia FPHL or female pattern hair loss [4]. Autosomal dominant genetic link is associated with baldness. There are over seven categories of male pattern baldness in which hair loss is both genetically and hormonally (androgens) controlled. In males 5DHT in hair follicles cause baldness in front and top of scalp region [2]. Hallmark characteristics of AGA include thinning and subsequent miniaturisation of terminal hairs to vellus hairs. In women frontal hairline is usually spared. In females iron deficiency, thyroid disorders and even hormonal imbalances may cause progressive hair loss.

Rationale

Grafts taken from hair-bearing areas on the back and sides of the scalp show Donor Dominance and grow at recipient sites on the front and top of the scalp as described by Dr. Norman Orentreich is considered as the golden rationale behind hair transplantation [2]. The concept is that transplanted autografts maintain their original characteristics and were not subjected to hormonal related male pattern baldness [5].

Methods of Hair Transplantation

- FUT (follicular unit transplantation or strip method)
- FUE (follicular unit excision)

Patient Selection and Treatment Planning

Hair restoration can be performed in any person with pattern hair loss, with good donor area in good general health. Meticulous treatment planning is required by a skilled surgical team for this procedure since hair loss is a progressive condition. Genetic predisposition of the patient should be taken into consideration. Younger patients with unrealistic expectation must be taken care off. Indications include: Androgenic alopecia, Eyebrow, beard, moustache reconstruction, Pubic hair transplantation, Scarring alopecia, and Eyelash transplantation.

Candidates for transplantation must be assessed for potential donor areas with sufficient hair to cover the balding, thinning areas completely and hair density for favourable outcome [2]. Because there is a limited donor supply, and because the patient is facing a progressive hair loss, there will always be an issue of supply and demand [3]. The donor area should be evaluated for the number of hairs per surface unit, the density of hairs per follicular unit, the colour and texture of the hair and skin, the laxity and thickness of the scalp, and the texture of the hair [3]. Other factors that impact the visible density of the hairs include the hair colour, hair shaft size, color contrast between the scalp and the hair, and the presence of curl. These factors should all be considered and discussed with the patient during their initial consultation and during planning for their hair restoration. Thorough documentation and photographs are required throughout the procedure to evaluate the outcome.

Preoperative Patient Preparation

Proper medical fitness needs to be obtained with blood tests and tests to rule out endocrine disorders need to be done. 2% lidocaine 30 ml +bupivacaine 0.5% 4 ml +60ml normal saline is applicable. Tumescence solution (500ml normal saline+1:1000 epinephrine) is given to avoid injury to neurovascular bundle. Regional nerve blocks are given (supraorbital, zygomaticofrontal, occipital, supratrochlear).

Steps involved in the patient preparation and hair follicle transplantation are shown in Figures 3-7.



Figure 3, 4 and 5. Patient preparation and hair follicle transplantation.



Figure 6 and 7. Patient preparation and hair follicle transplantation.

Follicular Unit Transplantation or Strip Method

A strip centered around occipital protuberance is recommended. The graft harvesting procedure starts with donor site preparation by clipping scalp tissue with hair clippers just to the edge of what is to be harvested. Width of strip is usually 10-15 mm with 2500-3000 grafts. A no:10 blade is used to incise the strip by elliptical incision. Skin, subcutaneous tissue is separated without injury to the occipital neurovascular bundle. Processing of donor scalp with sectioning of graft into follicular units is done. Micrografts and minigrafts are sorted. They are kept chilled to prevent desiccation. The recipient site is prepared with anesthetic blocks and 4 mm deep puncturing is done for placement of grafts. Initially grafts are held by platelet and fibrin and hair shafts may shed. Tension and cauterisation must be avoided at the donor site as it may cause scarring. Absorbable monocryl can provide hemostasis [Figures 8,9].



Figures 8, and 9. Follicular Unit Transplantation/strip method

Advantages

- Shorter operative time
- Less transection of follicle rate
- Less learning curve

Follicular Unit Excision

In FUE harvesting individual follicular units Manual punch technique was been largely replaced, first by motorized devices, such as the SAFE system and Ellis system which have the continually rotating punch. Motorised devices utilising oscillation and vibration are also available (Mamba system). Procedure include trimming the entire back and sides of the scalp, leaving the hairs in this total donor area at a length of 2 mm, so that the natural curve of the hair shaft is maintained. Partial shave or tunnelling method can also be adopted. No shave and 'long hair' approaches are challenging and time-consuming, but allow patients to have a fully presentable donor area immediately after the procedure [4]. Once the donor zone is anesthetized, with the patient in a prone position, graft excisions may proceed painlessly, starting from the bottom right corner of the scalp (with a righthanded surgeon), proceeding cephalically and to the left in a specific pattern. Direction, pressure and depth of punch are important factors. These grafts are placed into chilled storage solution.

The "hybrid" approach, combining FUE with FUT, usually involves removing a single donor strip from the central back of the head, then, after suturing close the area of the strip, additional grafts from the surrounding safe donor areas are harvested by FUE, still respecting the borders of the safe donor area. Advantages of FUE includes increased number of grafts can be harvested, less scarring, donor site laxity and density not significant determinant and less healing time.

Factors Determining Outcome

Several factors like hair density, diameter, colour and texture influence the outcome of hair transplantation [Figures 10,11]. Degree and pattern of baldness and patient expectation are also inevitable factors. These factors needed to be taken into account and explained to the patient during treatment planning.



Figure 10. Pre-treatment photo



Figure 11. Post-treatment photo

Certain literatures provide insight into the use of Platelet rich fibrin in enhancing the effects of hair transplantation [6]. They use cell growth factors present in PRF to regenerate and restore the inactive hair follicle. Injection of PRF increases hair growth. They accumulate platelets and release cytokines in a fibrin clot. Important growth factors in PRF include TGF B, PDGF, IGF-1, VEGF and EGF.

Postoperative Instructions and Complications

Postoperative antibiotics and analgesics are required. Post-operative swelling and oedema may occur by 3rd day. It is temporary and can be managed by ice compressions. Use of intradermal triamcinolone acetonide and short course of oral steroids advocated. Infection and keloid formation are rare. Drug induced gastritis, crust at recipient sites, sterile pustules at recipient area are some of the frequent complications. Folliculitis and numbness of scalp may also occur.

Advances

- Robotic FUE
- Cloning
- Cell Based Therapy

Trichogenic cells are isolated from scalp, cultured in media, dissociated and injected back to scalp in cell-based therapy.

CONCLUSION

Standardised procedures are required for good outcome of hair transplantation procedure. Proper training to the surgeon and assistant is required for the success since the procedure is technique sensitive.

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