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Views and Practice

Surgical hair restoration

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Introduction

It is estimated that the proportion of men with moderate to extensive hair loss increases with increasing age, ranging from 16% for men 18-29 years of age to 53% of men 40-49.[1] Most of the hair loss in men is male pattern baldness. This is of great psychosocial impact,[2] and warrants intervention.

Physiology and classification

The average scalp has approximately 110,000 to 150,000 hairs. About 50 to 100 hairs are shed per day during the telogen phase. This phase lasts approximately three months. The anagen (growing) phase lasts about two to eight years and approximately 90% of hairs are in this phase. In between is the catagen or degradation phase which lasts several weeks. Short duration of hair loss in relation to life events usually presents as exaggeration of normal hair cycle and does not need intervention. Male pattern baldness (MPB) is a hereditary alopecia controlled by a single, dominant, sex-limited autosomal gene; with polygenetic modifying factors such as androgen production and age which affect its expressivity. Male pattern baldness progresses in a specific pattern over several years. It is not reversible unless intervened. The degree of severity is usually referred to in the Norwood classification.[3,4]

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Treatment options

Medical

Dihydrotestosterone (DHT) has been identified as the trigger of androgenic alopecia. Finasteride is a 5-alpha reductase inhibitor originally marketed as Proscar® for the treatment of symptomatic benign prostatic hyperplasia. Finasteride decreases the local conversion of testosterone to DHT. Treatment with finasteride halts further hair loss in 90% of users. In 1997, the United States Food and Drug Administration (FDA) granted the approval of marketing of finasteride (Propecia®) for male pattern baldness. It takes six months to see the initial effect and the effect will plateau off in 1.5 years. Major side effects occur in 1% of users which include loss of libido, gynaecomastia and testicular pain.

Minoxidil was discovered in 1985 and is a potent anti-hypertensive. The mechanism by which it affects hair growth is largely unknown but one possible mode of action is local vasodilatory effect

on the follicular epithelium. Another possible effect is to convert the vellus hair to terminal hair and improve in hair thickness. It is a topically applied medication with concentration ranging from 2% to over 6%. The success rate ranges from 35% to 70%. The most common side effect is scalp irritation and usually it takes three to six months to see the effect.

Surgery

The first hair transplants were performed by Dieffenbach in 1822. In late 1950s, Orentreich's grafting techniques established the foundation on modern hair transplant.[5] Surgery is possible because the hairs on the occipital and bilateral temporal areas are not shed even in old age. Orentreich described "donor dominance" of the hormone-insensitive follicles in these areas which marked the possibility of transplanting these hairs into areas of androgenic alopecia such as the crown, mid scalp and hairline. There are many different types of surgical treatment, ranging from scalp flaps, scalp reduction, scalp expansion, punch grafts, strip grafts in the early days to current method of follicular unit extraction and follicular unit transfer. Unfortunately the area of the donor site cannot cover the potential maximum bald area of the scalp and therefore "surgery only" is not the complete solution. Most of the time, an optimal surgical outcome requires combination therapies with oral and topical medications.

Early methods

Flaps of the hairy scalp for the treatment of MPB were first described by Lamont in 1957.[6] Elliott,[7,8] Juri,[9-12] Ezaki,[13] Nordstrom,[14] Mayer,[15] and Fleming[16] described various modifications of the temporo-parieto-occipital flap for the hairline reconstruction.

Scalp reduction was introduced by Unger and Unger in 1978 to improve the ratio of donor site to recipient sites in punch graft procedures.[17] This procedure is reserved for patients with type III to VI MPB.

Manders and co-authors used specially designed scalp expanders to allow greater expansion of the temporal donor site area for the reconstruction of the bald skin at the hairline.[18,19]

Synthetic implants were nylon filaments simulating hairs and were inserted to bald scalp follicles in the 80s.[20] The result was highly unsatisfactory, resulting in a pronounced foreign body reaction, fibrosis, scalp atrophy and scarring in many cases. Punch grafting was first described by Orentreich in 1959. Multiple punch autografts were harvested from the occipital area and were transplanted to the recipient sites such as the frontal hairline, mid scalp and the crown.[21] An average of 40 to 60 grafts per session and four sessions were usually required to achieve basic coverage of one area. However, an un-natural "row appearance" at the recipient sites was usually seen, due to the large size of the punch graft.

Current method

The follicular unit is the naturally occurring grouping of hair follicles in the skin.[22] Follicular units typically comprise a single hair (45%), two hairs (42%) and three hairs (7%).[23] Mini-grafts comprise 3-6 hairs while micrografts contain 1-2 hairs. The harvesting method can be largely divided into the strip method and the follicular unit extraction. The strip method can be done either by using the multi-bladed knife or single elliptical excision at the occipital scalp. The trade-off is a faster harvesting time with the multi-bladed knife and less follicular loss with elliptical excision. Triphytic closure is a commonly used technique to make the donor scar less obvious but obvious scar may sometimes occurs and is difficult to correct afterwards.

Follicular unit extraction (FUE) directly from donor site was named by Woods.[24] It was actually first described in literature by Rassman et al in 2002.[25] The technique of FUE makes use of 0.8 mm to 1.2 mm punches in the harvesting of follicular units. It is highly operator-dependent and

the learning curve is steep in order to reduce the transection rate. Although it is not a scarless technique, it prevents a linear scar and is particular important for patients who wear their hair short. It is a scar-spreading technique and all small holes (size around 1 mm) will heal with secondary intention and can prevent tension discomfort after suturing with the strip technique. It has the drawback of being more time-consuming when compared with the strip technique. I use exclusively the follicular unit extraction technique so as to avoid a conspicuous linear scar.

My approach to the patient

History

This is an aesthetic procedure and it is important to interview the patient and to counsel them that hair loss is progressive. Unless life-long finasteride is used, the patient can expect to require further hair transplantation in the future and the donor site may not be able to cover all the potential bald areas. Younger patients are recommended to start medical therapy, finasteride, and to contemplate surgery after hair loss is stabilised. The surgeon needs to consider the design of the hairline and the availability of hair. Therefore, thorough discussion with the patient is important. Hair density is checked so as to estimate the feasibility of meeting the patient's request. In conditions such as alopecia areata, hair transplant is only the last resort and can only be carried out when the condition has stabilised for five years. On the other hand, surgery may re-activate the disease. For post-traumatic scarring scalp, the success rate of grafting is much less than the virgin scalp.

Investigation

The screening for clotting disorder and infective conditions such as hepatitis and HIV status are done according to the surgeons' preference.

Preparation

Vitamin E and certain Chinese herbal medicine are known to increase bleeding during operation and should be stopped two weeks prior to surgery. Aspirin and other anti-coagulants should be stopped with the permission of the prescribing physician. The hair is shampooed the night before and in the morning of surgery. For follicular unit hair extraction, the donor site area needs to be shaved very short for accurate harvesting. This can be done just before surgery. The hairline is designed and the area of hair implantation is marked. After explanation of the surgery, the consent is signed. The possibility that further surgery may be needed for optimal density is explained, as one session of hair transplantation may not be able to achieve this. Antibiotics, analgesia as pre-emptive analgesia and sedatives are given.

Operation

The patient is placed in a prone position on a massage bed and 2% xylocaine is administrated as occipital nerve block. The hair harvesting area is infiltrated with 1% xylocaine with 1:100,000 adrenaline. Follicular units are harvested with 0.8 mm to 1.2 mm punches under magnification. Follicles are kept in a four degree Celsius normal saline solution.

After harvesting is completed, the patient is placed in a semi-sitting position and a 2% xylocaine nerve block to the supratrochlear and supraorbital nerves is performed. The area to be implanted is also infiltrated with xylocaine with adrenaline. Follicles are implanted at an inclined angle according to the nearby vellus hairs. Hairs are secured with the serum and no suturing is necessary. Single hair follicular units are reserved for the hairline zone and an irregular hairline is created to give a natural appearance.

Postoperativecare

The donor site and recipient sites are rinsed gently with lukewarm water. The donor site is covered with a simple dressing while the recipient site is left open. Oral analgesics and antibiotics are

continued. Oedema occurs in most patients and a short course of low-dose steroid is prescribed. The patient is asked to rest for the initial few days. Normal activities can be resumed and the hair may be washed one week later. Hypoesthesia at the donor and recipient sites last for one day to two weeks, although sometimes this may persist for up to two months.

Follow-up and expectation

The patient is followed-up on the first day and one week after operation. A portion of the implanted hairs is expected to undergo telogen phase from three to five weeks after the operation. The unshed hair will continue to grow and the final result is expected to settle in nine months to one year.

Conclusion

Surgical hair restoration is part of the overall treatment for patients with a problem of alopecia.

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