Figure 12.19 **Female androgenetic alopecia, Ludwig type II, (a) before and (b) after correction by one session of follicular unit long (FUL) hair grafts.**

Figure 12.20 **Male androgenetic alopecia (a) before and (b) 10 years after correction by one session of follicular unit transplantation (FUL).**

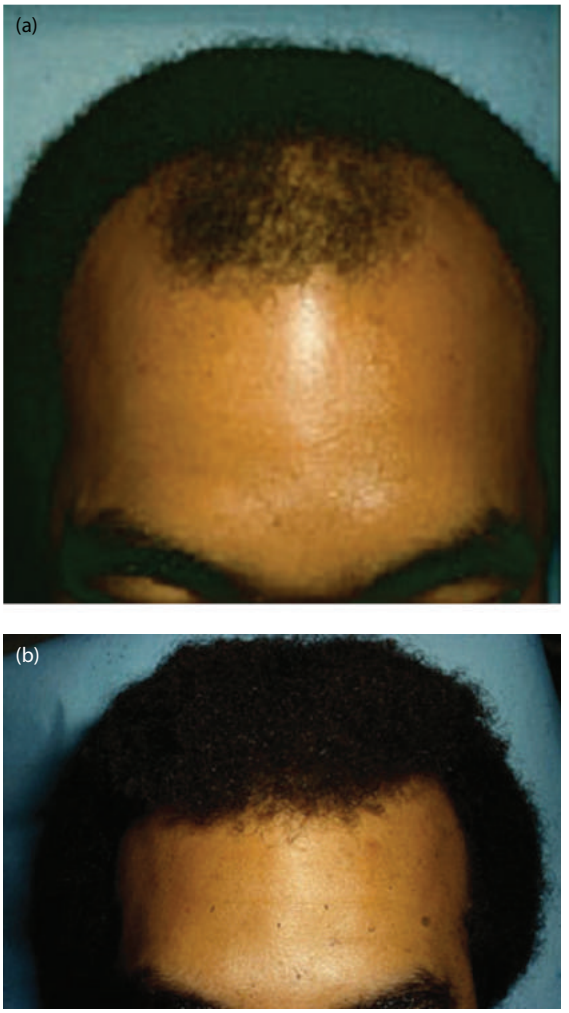

Figure 12.21 **Male androgenetic alopecia (a) before and (b) after correction with two small vertical flaps on the frontal area.**

method of graft harvesting in the minority of black patients. It relies on blind excision, and given the follicle curl, the risk of intradermal transection is extremely high.

- All the FU harvested are then inserted with forceps in each slit incision done with needles or microsurgery blades in the recipient area (see Chapter 15).

The goal is to create hair density and a natural aspect of the frontal hairline through the best selection of FU according to their caliber, shape, and color shaft. The pattern and type of grafts used in patients of African heritage is different compared with other ethnicities. The hairline for most black patients is flatter than is seen for Caucasians, but not as flat as is seen for Asians.

- Surgical correction of male pattern baldness was initiated early in the twentieth century by the development of flaps. In the technique of vertical flaps,[23] a strip of scalp of variable size is taken at the crown, placed on the bald area, and sutured; the hair is left long and the band of scalp retains its vascularization via a rotation pedicle. This process should be proposed to correct stable male frontal baldness (Hamilton stages IV and V). It allows you to recreate a natural frontal hairline, with a reduction of the frontotemporal recession, and hair orientated obliquely forward and coming through the anterior thin scar line to help obscure it.
- Scalp excision[23] consists of removing part of the bald area, following a variable design, then putting together and suturing the hairy regions. Excision may be facilitated by prior distension of hairy areas of the crown with an expander (a balloon inflated progressively, with saline injections). These prostheses are set in position, after local anesthesia in the separated galeotic membrane, to cause additional laxity of the surface to be excised; a wide bald zone can be removed after 1 month of distension.

CONCLUSION

The hair and scalp pathology of African Americans presents, in addition to those disorders common to the other main ethnic groups, particular genetic characteristics, particular sociocultural characteristics (such as types of hairstyles), particular chemical characteristics of the hair (such as a dry shaft), and peculiarities of scalp tissue (the infl mmatory responses).

Treatment and prevention advice will be essentially guided by the fragility of the hair shaft, the risks of folliculitis, and the risk of poor wound healing, and will aim to try to change some traditional styling habits.

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13 Management of definitive hair alopecia in Asians

Damkerng Pathomvanich

INTRODUCTION

Hair loss affects both Asian men and women; however, the incidence and severity of the baldness are less than in Caucasians.[1,2] Hair transplantation in the Asian population has been increasing in popularity over the past decade, but is associated with unique demands. The International Society of Hair Restoration Surgery (ISHRS) practice census results in 2013 showed there were 102,702 hair transplantation cases being performed in Asia, ranking the highest in the world, a 10% increase from 2010. There were 54,343 procedures in Europe and 88,340 procedures in the United States.[3] It is paramount to understand the Asian culture, knowing the difference in hair character, skull and facial features, before performing hair transplantation surgery, to achieve optimal results and avoid litigation.

ASIAN FEATURES

Anatomy

The Asian skull has less frontal and occipital projection than the more oblong Caucasian skull, and therefore appears round (Figure 13.1). The Asian face also appears round, with less frontal projection, to almost flat in some Asians, posing a special challenge for hairline placement.

Hair character

Asians in general have coarser, straight, black hair in contrast to many different color shades found in Caucasians; however, variations exist among Asian ethnicities. There are many studies on hair density in Asians, with biopsy results confirming low hair density compare to Caucasians (Figure 13.2). In one study by Jui-Hung Ko, Yu-Huei Huang, and Tseng-Tong Kuo, the average hair

Figure 13.1 **(a) Rounder head with less frontal projection in an Asian patient, compared with (b) a typical Caucasian.**

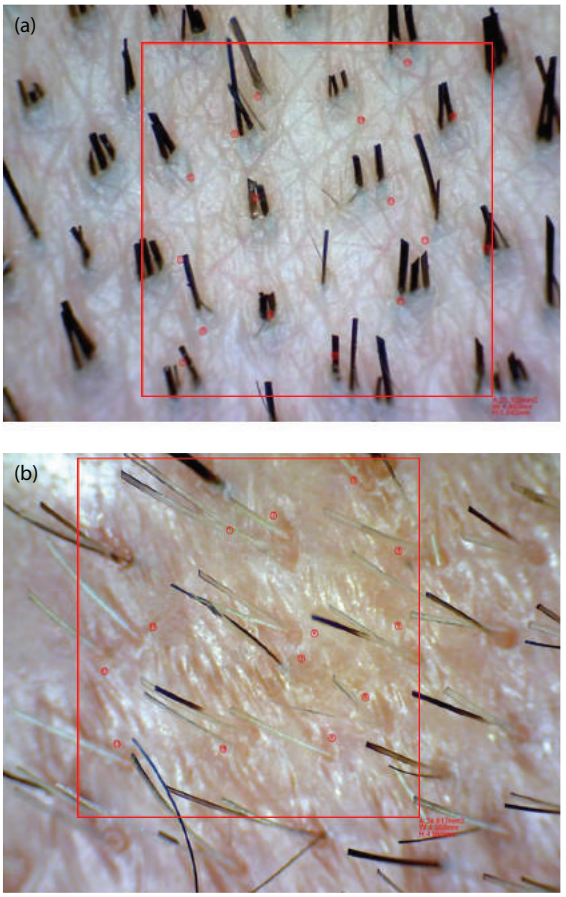

Figure 13.2 **(a) Picture from digital VDO microscope 65×; the density can be counted precisely with the red marker and also can identify any lesions. Gray hairs are visualized well in (b) and are easy to count. Patient identity including the picture can be recorded on the chart.**

counts of total hairs = 21.3, terminal hairs = 20.5, vellus hairs = 0.8, and follicular units = 9.4 by 4 mm punch biopsy. The mean ratio of anagen hair to telogen hair was 91.6:8.4 and of terminal hair to vellus hair was 25.3:1. The average density of hair follicles was 1.69 mm. The mean counts of terminal hairs, total hairs, follicular units, and hair follicles/mm^2 were significantly different between different age groups.[4]

Imagawa studied androgenic alopecia in Japan and found at the midocciput, Asians have 80–90 FU/cm^2 or 170 hairs/cm^2, while in the temporal zone; they have 55–70 FU/cm^2 or 100–127 hairs/cm^2. This represents 1.8 hairs per follicular unit (FU). Caucasians have a similar density of FUs, but have 2.3 hairs per FU, and therefore a greater total number of hairs. Studies of donor zone hair shafts in androgenic alopecia revealed an average diameter of 71 µm, and a range of 63–79 µm. In Asians, the average follicle length from epidermis to dermal papilla is 5.5 mm compared to 4.5 mm in Caucasians; therefore, it has a higher transection rate during the follicular unit extraction (FUE) procedure as well as strip.[5] Kim reported density in Korean hair at midocciput = 120 hairs/cm^2 and 100 hairs/cm^2 at the temporal region. It is interesting to see variation density in people from different Asian countries. Kim reported 45% of one hair follicular unit and 42 hairs follicular unit and 7% of three hairs follicular unit that will challenge Korean hair surgeons in performing hair transplantation.[6]

Most Asians have black hair and light skin, which creates a contrast rarely seen in Caucasians. This can become a concern in individuals with wide scars. In addition, Asian skin is more prone than Caucasian skin to keloid or hypertrophic scarring, hyperpigmentation, and hypopigmentation, but to a lesser extent than African skin. The problematic scars most commonly occur at the donor site, especially at the mastoid region.

Medical treatment

The two medications that the U.S. Food and Drug Administration (FDA) has approved to treat male pattern hair loss are oral finasteride and topical minoxidil.[7,8] Finasteride is a competitive inhibitor of type II 5AR. The recommended dosage of finasteride is 1 mg/day; however, due to its side effect of erectile dysfunction (ED) with reports of irreversible ED, many Asian men have shied away from this drug. Many experienced hair surgeons have cut down the dosage to 0.5 mg/day or every other day or even only 2–3 times per week. Some even lower the dosage to 0.3 mg/day and note fewer side effects, but still give the patient the overall same result. However, there is no scientific report to document that low-dose finasteride is effective to treat male pattern baldness. Since the change in dose is not approved as standard medical treatment, most physicians stick to finasteride 1 mg/day. In my experience the side effects of this drug in Asians tend to be higher than in Caucasians. Before prescribing the drug, we routinely check prostate-specific antigen (PSA) in men older than age 40.

Topical minoxidil has not been popular in Asia because the weather is warmer, and patients commonly complain of sticky scalp, no time to apply, as well as being itchy and irritating to the scalp. In this practice, 5% minoxidil lotion is used in both men and women. Rogaine foam is not available worldwide and claims to have less irritation to the scalp. In some Asian countries concentrations of minoxidil at 10%–15% or higher are available, but no study regarding the efficacy of these concentrations compares with 5% minoxidil.

We instruct most patients with genetic hair loss to consider the following two drugs despite some negative side eff cts.

Figure 13.3 **(a) Before and (b) after—oral minoxidil grows hairs at temples, the humps, and fringe and made hair transplantation possible at front and top.**

Dutasteride (*Avodart*) is a potent inhibitor of type I and type II 5AR. It is not yet FDA approved to be used in male pattern baldness. Dutasteride improved male pattern hair loss in a randomized study in identical twins.[9] I have limited experience using this drug but did not see consistency of hair growth when a patient switched from finasteride to dutasteride, but I did note an increased incidence of ED over the finasteride group.

There are many over-the-counter drugs in the Asian market, especially a product named 101 from China with no documented proof to stop hair loss.

I have conducted research on growth factor application to the scalp with dermal roller for thinning hair for 6 months with no improvement of hair loss (oral presentation at ISHRS regional live surgery workshop in Bangkok 2010).

For those patients who have extensive baldness or are poor candidates for hair transplantation and want to proceed with hair restoration surgery, I give a trial of low-dose minoxidil tablets. Since the drug is not FDA approved to use in hair loss, the patient will need to be informed of the off-label use and sign consent. Of the reported side effects, salt retention and hypertrichosis are the most common side effects encountered. If the patient responds to the drug without side effects, he or she needs to maintain use for life and needs yearly blood tests and electrocardiogram (ECG). Oral minoxidil treatment can make previously thought impossible hair transplantation become possible (Figure 13.3).

Low-level laser light therapy has been in the market for many years to treat hair loss. Laser comb from Hair Max is FDA approved; however, patient-reported feedback has been negative, without documented hair growth or the stopping of further hair loss.[10]

CORRECTION OF MALE PATTERN BALDNESS IN ASIANS

At consultation, basic history and physical examination plus in-depth history of the patient's hair loss, including hair loss in family members (both maternal and paternal), are very important notes for the surgeon to evaluate prior to surgery. Any medical problems found need to be treated by appropriate specialists. The length and width of permanent donor hair are measured, donor density is counted in different zones with video (VDO) microscope. Test for scalp laxity, measure recipient and donor areas,

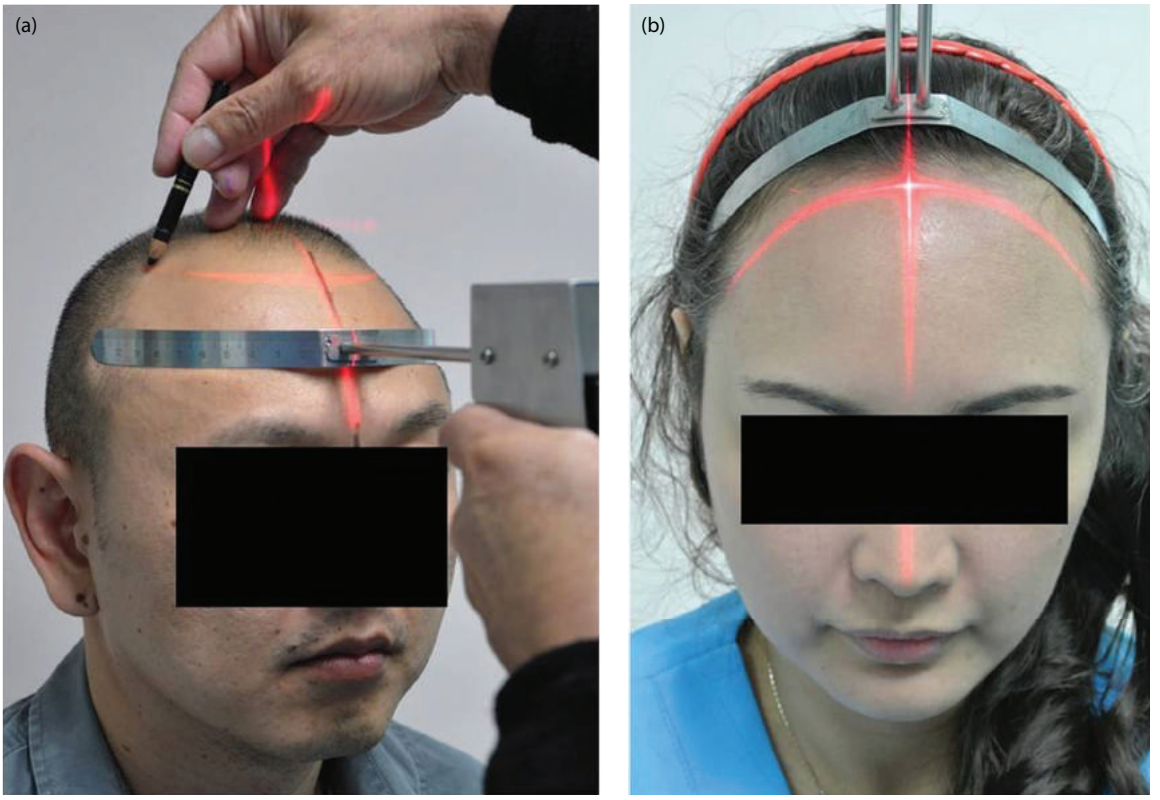

Figure 13.4 **(a,b) Rapid laser hairline device assists the surgeon to achieve symmetric hair line placement and shape.**

and examine the entire scalp for any existing lesion. The patient is then assessed as to whether he or she is a good candidate for surgery, medical therapy, or both.

Hair line design is challenging in both men and women. The majority of surgeons use visual (eyeball) or some form of measurement that is both time consuming and difficult to achieve symmetric appearance. I use a laser hair line device that I developed[11] (Figure 13.4); I then modify the shape and make irregular lines as appropriate.

I then use the modified Chang method to calculate the number of grafts to be transplanted.[12,13]

Patients need to be informed that there are two types of methods to harvest donor graft, strip (follicular unit transplantation [FUT]) and follicular unit extraction (FUE). The public often sees advertisements that "FUE is scarless and less painful" compared to the strip method with linear scars. Surgeons must inform the patient of the differences of each technique and advise what is the best method (FUT or FUE) for the patient. If the surgeon does not perform FUE and the patient insists, he or she should be referred to a surgeon who performs FUE, or vice versa.

A safe donor area is selected and marked. A long single strip or multiple strips can be performed as surgically feasible. A mega session of 3000–4000 plus grafts can be obtained for those who have both good density and scalp laxity. However, Asian hair tends to have lower density, making 3000–4000 graft mega-sessions in general more difficult compared with Caucasians.

Asian skin tends to have thicker dermis than Caucasians, more collagen density, and larger melanosomes with more melanin production. These characteristics lead to higher tendencies of developing hypertrophic scar and hyperpigmentation after skin injury. Hair follicles are longer in Asians, and the preference is to harvest by strip approach, except for patients with tight scalp or if patients want to wear the hair very short, then FUE is an excellent alternative.

FUT or strip is by far the most common technique currently used for donor harvesting in hair restoration surgery throughout the world. The ISHRS 2013 census results utilize FUT 68% compared with 32% for FUE.[3] The majority of surgeons use blind harvesting by cutting parallel to the hair follicle or scoring deep enough and then using the spreader to separate the incision. The stem cells are located just short of 1 mm deep,[14,15] and there is a

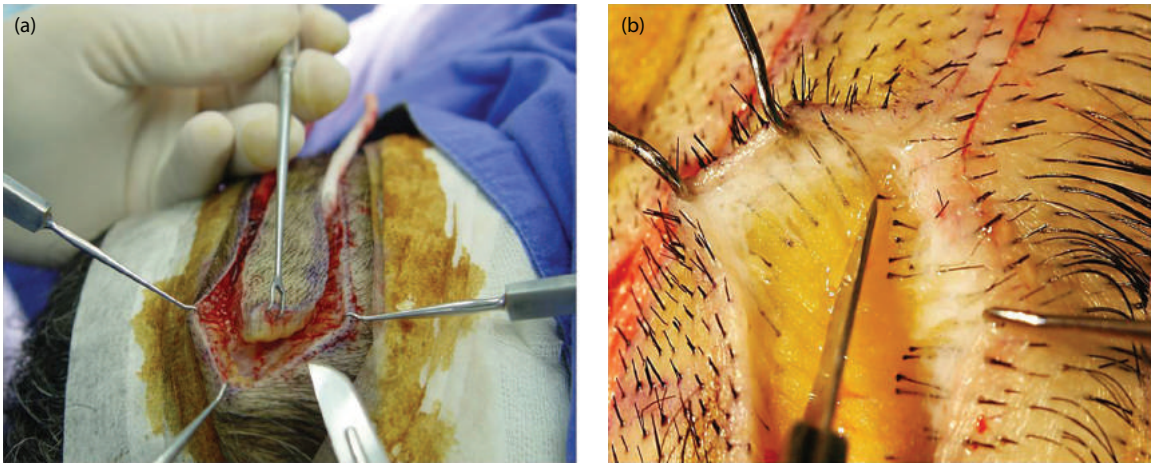

Figure 13.5 **(a,b) Donor harvesting with direct visualization assisted by skin hook to minimize transection and suction to clear blood from the field to speed dissection.**

potential for damage if blind scoring is too deep. Because Asian hairs are coarse and long and the scalp is thick, the chance for transection of the follicle is very high. To overcome this I have developed an open technique with a skin hook, thus minimizing follicular transection below 2%.[16] The technique is easy to master based on cutting under direct visualization; suction is helpful to clear the field to speed dissection (Figure 13.5).

Strip length and width are calculated, and the width must not be too wide to exceed closure without tension. The wider the strip, the greater is the potential for scar formation. I usually use the Mayer method,[17] but the laxity should be judged again at the end with an up-and-down push with the fingers before making a mark for the strip. I have found the Mayer method to be about 70% accurate. Previously, both inferior and double trichophytic closures were used, but no difference was found in the appearance of scarring and more time was wasted. Currently, I use only the inferior trichophytic closure, but the superior hanging edge is trimmed for easy closure in some patients. The wound is closed with 3/0 Nylon interrupt as retention sutures about 1.5 cm apart, and the bite is 1 cm away from the incision. The skin is then closed with running 4/0 Vicryl Rapide. In the past, a two-layered closure failed to produce minimal scarring (Figure 13.6) so I have not used it for the past 6 years.

Because slivering takes some time and desiccation might happen, especially for those surgeons who just started using this technique, I have designed a special slivering tray with a small chamber to house the normal saline solution. Medical-grade silicone is placed inside the chamber to submerge under saline solution. The strip is laid on top of silicone and also submerged in normal saline; both ends are fixed with 23G and 2–4 needles might be used to stabilize the strip for easy

Figure 13.6 **(a) A 2 cm wide strip excision at midocciput left (b) 1 year post-op with minimal donor scar.**

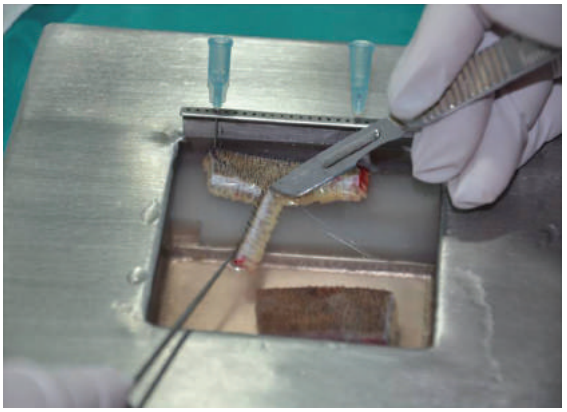

Figure 13.7 **Portion of strip is pinned at both ends with 23G for stabilization during sliver. Note the entire strip is submerged in normal saline to prevent desiccation.**

Figure 13.8 **One year post-op FUE with moth-eaten scar prominent in Asian with black hair and light color skin.**

slivering (Figure 13.7). A skin hook holds the superior edge on the end of the strip. Dissection is carried out with a 15-blade by cutting from the top to the bottom of the follicle. Abduction of the dissected strip speeds the cutting because both sides of the sliver are well visualized, thus minimizing transection.

The follicles are cut from a narrow strip under the microscope with 10 times magnification and stored in normal saline. The downside for the strip is to have a linear scar. Fortunately, for over 85% of my patients, the scars are minimal and almost undetectable. Less than 15% have a slightly wider scar, most likely due to intrinsic factors, which are many. If surgeons try to keep the excised strip at a width not to exceed 1.5 cm at midoccipt and not more than 1 cm at the temporoparietal area in the first session, minimize transection, and prevent desiccation of both the skin edges when closing, the scar will be minimal most of the time. For subsequent sessions, the scar in the majority of surgeries is included.

FUE (follicular unit extraction) is increasing in demand and rising in popularity.[18–20] This technique is usually limited to 1500–2000 grafts per session depend on the individual density; however, over 3000 grafts extracted in a single session was presented at the hair meeting, but no result of growth rate and donor scar were presented. There are several automated machines available (e.g., Neografts, Bell Hand Engine, Dental machine, robotic [ARTAS]) with some doctors still using the manual punch technique. My transection rate is higher with sharp punch, so a switch was made to dull punch and less transection and chubbier grafts were noted compared with the sharp punch. My experience of FUE is limited to the automated SAFE SYSTEM which uses a dull punch for graft extraction. The punch size of 0.9 is a workhorse, except with coarse hair with large follicular units a switch is made to 1 mm. The transection rate is in the range of 10% but improving with time and experience. The healing process is rapid and almost invisible after 1 week. Most patients experience no pain or minimal discomfort. Diffuse small scars from FUE are seen throughout the donor area. The growth rates from FUE are comparable to those from FUT (Figure 13.8).

Recipient site

I routinely use a supraorbital nerve block and tumescent fluid with epinephrine 1:100,000 plus triamcinolone.[21] A pre-made incision with 22G to 18G is used, and sometimes a precut blade size 0.7–1.2 mm, depending on the size of the follicle, is used for tough skin. Hair density in Asians is not as high as in Caucasians—35 grafts/cm^2 might give a patient a good outcome in one session. In my practice I use a two-handed technique for insertion. The right dominant hand holds a very fine sharp point straight forceps to insert the graft, and the left nondominant hand holds the curve forceps to open the incision, reducing trauma during insertion; and vice versa for those with a dominant left hand. On average, two to four assistants insert the grafts at the same time, if space permits, to reduce operative time. If the patient needs more grafts and the scalp is not tight, the stitches are removed at the midocciput region about 10 cm and either the inferior or the superior edge is re-excised. Sometimes FUE is used to obtain more grafts to avoid a wide scar. Grafts are carefully checked when the procedure is over to make sure all the grafts are settled well with good direction and that there is no visible bleeding at both donor and recipient sites. A head band is used to hold the dressing at the donor area and also compress the incision for hemostasis. The patient returns the next day for shampoo and wound care. The stitches are removed in 1 week. It will take at least one and a half years to look good (Figures 13.9 and 13.10).

Platelet-rich plasma (PRP) has been used in hair restoration surgery with unpredictable results.[22,23] ACell

Figure 13.9 **(a,c) Before and (b,d) 10 months after surgery, with weight loss and orthodontic treatment.**