

Complications and the Solutions

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For effective hair transplantation, we need to know not only how to produce good results, but also how to prevent surgical complications.

For each possible complication, I explain both the preventive methods as well as solutions, should these complications occur.

Nowadays, because we usually perform follicular unit transplantation, only complications related to follicular unit transplantation are discussed. These complications can be divided into two categories: medical and aesthetic.

Medical Complications

Undesirable Scar: Wide Scar, Hypertrophic Scar, and Keloid

Scarring is much more common in Asians than in Caucasians. Closure with little or no tension will leave a fine scar nearly every time. Tight donor closure can result in cosmetically unacceptable scars or necrosis (Figs. 1, 2).

To reduce wound tension in the donor area, the width of the harvesting strip should be less than 1.5 cm and less than 0.8 cm in the tight scalp. Occasionally, wide scars develop in younger patients, especially those with hyperelastic skin, even though there is no tension. In general, younger generations have a tendency to leave a larger scar than older patients, so be conservative in young patients under the age of 30. Trichophytic closure is also helpful to produce less noticeable scar lines in the donor area.

In case of a hypertrophic scar or keloid, a series of injections of intralesional corticosteroids (e.g., triamcinolone acetonide 5 to 20 mg/ml) is helpful to reduce the size or related symptom.

For subsequent donor harvest, it is recommended to take the second donor harvest about 5 or 10 mm apart from the previous scar rather than excise the strip including the previous scar. This is suggested because leaving two separate fine scars is better than a single wider donor scar. In addition, the width of the strip should be reduced to more than in the previous session so as not to put tension on the wound. If scar revision has been unsuccessful, W-plasty or follicular unit extraction (FUE) with implanting into the scar is another option.

Fig. 1. Scar 2 cm wide on donor site of 28-year-old man

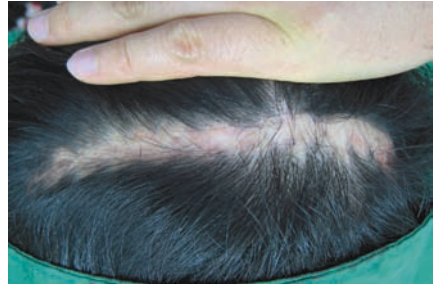


Fig. 2. Necrosis under excessive tension on donor area



Necrosis and Wound Dehiscence

When a wide donor strip exceeding the limits of tissue mobility is harvested, an extremely tight closure on the donor area will result. Excessive tension on the wound restricts circulation of blood, and it may result in necrosis and wound dehiscence. To prevent this from occurring, first reduce the wound width as much as possible and examine whether there is tension. If the closure is tension free, decide whether the strip can be widened a little bit more. Second, in case of too much tension on the wound after donor harvest, it is best to suture the wound as close as possible and leave the rest to heal by secondary intention. This method will produce a more acceptable scar and prevent necrosis.

Pain, Numbness, Hypoesthesia, Hyperesthesia, and Neuralgia

Pain or even anxiety about pain during operation can be minimized with adequate anesthesia and anxiolytics.

Most patients experience only mild pain in the donor area after surgery that can be controlled adequately by analgesics such as Tylenol. Many patients complain of numbness, hypoesthesia, or hyperesthesia on the donor or recipient site, but this

usually disappears within several months after the surgery. Occasionally, some patients may experience neuralgia: a sharp, shooting pain or an uncomfortable burning or tingling sensation on the head, superior to the donor area.

Neuralgia may be the result of nerve injury in the donor area followed by abnormal nerve healing. It is helpful to inject corticosteroid mixed with 0.5% bupivacaine into the donor suture site. To reduce dysesthesia, (1) electrical coagulation is prohibited or minimized during surgery, (2) dissection should be done as superficially as possible in the subcutaneous fat layer to avoid damage to the neurovascular bundles in the deep layer, (3) and tension on the donor site is reduced for comfortable closure.

Folliculitis

Folliculitis can occur within 2 weeks to 4 months after surgery (Fig. 3). It usually disappears spontaneously in a few months, but occasionally a chronic recurrent form of folliculitis could develop. This may be caused by a foreign-body reaction of recipient dermis against the epidermal component of the transplanted hair or a small fragment of hair.

Fortunately, this problem eventually clears and rarely reduces eventual growth, although it can be delayed. Treatment consists of shampooing the scalp twice a day, antibiotics p.o. or topical, topical steroids, and drainage of pustules if necessary.

Infection

Infection is extremely rare in hair transplantation, but it can occur in immunocompromised patients with uncontrolled diabetes mellitus, liver cirrhosis (Fig. 4), or excessive tension on the donor site, among other conditions. As a means of



Fig. 3. Folliculitis after follicular unit transplantation

Fig. 4. Infection on donor area of early liver cirrhosis patient



Fig. 5. Blood coagulopathy on the recipient area of patient with low platelet count



prevention, preoperative cleansing of the scalp with shampoo reduces the colony counts in the skin, resulting in less risk of infection.

The use of systemic antibiotics postoperatively is also necessary for prevention. It is definitely important to close the donor area without any tension. For treatment, systemic antibiotics are mandatory. The use of antiseptic shampoo such as surgical scrub is also appropriate for a few days after the operation.

Bleeding

It is very uncommon to see bleeding in hair transplantation. However, if patients do not discontinue medications such as aspirin and vitamin E for 2 to 3 weeks, bleeding complicates placement of grafts in the recipient sites (Fig. 5). Sometimes alcohol consumption before surgery and high blood pressure cause more bleeding in the scalp.

If there is bleeding in the donor area after suture, it can be controlled with additional sutures or an elastic bandage on the donor area. If bleeding occurs in the recipient area after trauma to the transplanted site, apply direct pressure with a gauze pad for 10 min. A blood coagulation test should be conducted before surgery to rule out any bleeding disorders such as Von Willebrand's disease, abnormal platelet count, etc.

Hiccups

Although very rare, hiccups may occur during or after the transplant procedure. Most hiccups are usually transient, but sometimes they can last 2 to 3 days. The etiology is not known, but it may be irritation of a sensory branch of the phrenic nerve that innervates the retroauricular area.

Hiccups have also been found to occur with the intravenous administration of diazepam or midazolam. In this case, diluting the diazepam and injecting it slowly is said to aid hiccup prevention. Treatment consists of lidocaine injection in the donor area, phrenic nerve massage, warm water intake, and medications such as chlorpromazine, traquina, and simethicone.

Syncope

Syncope is uncommon but generally occurs when the patient stands up suddenly after lying down on the operating table for a long time. To prevent this, leg exercise, frequent position change during graft insertion, and frequent breaks with fluid intake during surgery are necessary. If syncope occurs, the patient should lie down again on the table. Then, vital signs should be taken and basic support given.

Aesthetic Complications

Unnatural Appearance: Unnatural Hairline, Bad Hair Direction

The hair diameter of Asians is much greater than that of Caucasians, so two- or three-hair follicular units make an unnatural hairline if transplanted in the anterior hairline zone (Fig. 6). Therefore, only single-hair follicular units should be transplanted in the anterior hairline area to achieve a natural appearance. The operation should be conducted by using the method that produces a natural hairline. Furthermore, hair should be transplanted in the same direction as the existing hair follicles to maintain consistency with hair direction.



Fig. 6. Unnatural hairline after follicular unit transplantation

Poor Growth and Ongoing Hair Loss

Poor survival is also very rare in follicular unit transplantation by an experienced surgeon and assistants. It is caused by follicle trauma by mal-handling of the grafts during the procedure: transection, manipulation, desiccation, oxygen starvation, etc. To avoid poor growth, it is important to keep each step or protocol that may influence this result.

Even though the actual survival rate is excellent, growth may seem to be poor in individuals with fine hair (Fig. 7). Therefore, it is important to be careful when selecting patients with hair diameter less than 60 μm . Poor growth within 1 or more years after surgery occurs not only because of poor survival but also because of loss of preexisting hair (Fig. 8). Male or female pattern hair loss is not static but



Fig. 7. Poor result in patient with fine hair



Fig. 8. Poor result due to ongoing hair loss in young patient

Fig. 9. Temporary hair loss on donor suture site



ongoing with time. Patients should be warned that hair loss is ongoing. If they are not informed of this, they will complain of poor results after a few years, especially young patients.

Therefore, medication such as finasteride is essential to delay ongoing hair loss. Sometimes use of hairpieces or heavy smoking affects the survival rate of the transplanted hairs.

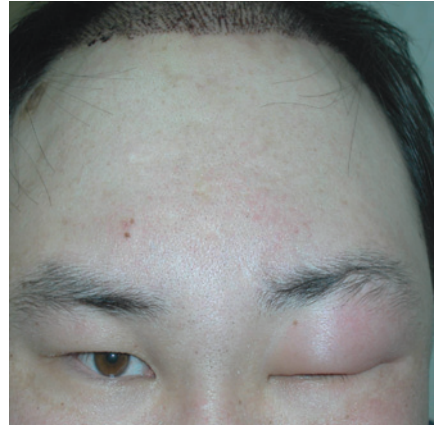
Temporary Hair Loss After Surgery

Temporary loss of preexisting hair can occur in the donor and recipient area 2 to 3 weeks after the operation (Fig. 9). Regrowth of the hair appears at around the same time that the transplanted hair grows. Anagen hair can be shed along the suture line, possibly because of temporary poor blood circulation, which is especially more common in the high-tension suture area. Temporary hair loss varies from a small amount to a severe degree. Some of the preexisting hair follicles fall out because of poor circulation associated with capillary damage after needle insertion in the recipient area. It is not a complication but an inevitable, normal process if the patient has preexisting hairs in the recipient area. Shedding of preexisting hair is more common and more severe if the patient has more preexisting hairs that are more densely packed. Minoxidil use before and after the procedure seems to be helpful for temporary hair loss.

Facial Edema

Facial swelling prohibits patients from returning to their daily lives quickly after hair transplantation (Fig. 10). It begins on the second or third postoperative day and can last 3–7 days, gradually spreading downward from the forehead to the eyelids, nose, and cheeks as a consequence of lymphatic drainage and gravity.

Fig. 10. Edema on forehead and upper eyelid at 4 days after surgery



It is severe in large sessions and in those patients who do not rest postoperatively. If it develops, there is no further treatment or medication available; therefore, prevention is crucial.

There are many methods to prevent or reduce forehead edema.

1. Steroid is the most powerful agent. It can be used in a mixed form in the local anesthetic solution or given i.m. and p.o. for a few days postoperatively.
2. Applying a pressure bandage or turban-style wrap is also helpful.
3. Ice packs on the forehead (not on the transplanted area) are beneficial.
4. Body positioning such as supine or lateral decubitus for 2 days after surgery helps the lymphatic drainage flow toward the temporal and occipital scalp because of gravity, resulting in no or minimal forehead edema.

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Pitting

There is also an upsurge of complaints concerning close-up defects such as pitting and tenting due to the higher expectation from patients.

“Pitting” is defined as the depressed appearance of the grafts as a result of implanting the hair follicle units deeper than the surrounding skin surface (Fig. 11). It is noticeable under direct light and is caused by these situations:

1. Slits and holes being too deep
2. Slits and holes being bigger than the grafts

Pitting used to be seen in conventional micro- and mini-grafting. (See Fig. 2 in chapter on “Omnigraft™”).

Fig. 11. Pitting



Prevention of Pitting

1. Make the slits and holes of appropriately the same size as the graft
2. Avoid the use of punch grafts
3. Avoid burying the grafts

Repair of Pitting

1. Adding on density by follicular unit transplantation can camouflage the pits. An additional session is expected as large quantities of grafts are usually required.
2. Excise the pitted grafts using a 1- to 1.2-mm punch in selected cases.
3. Use electro-epilation.

Tenting (Goosebump Appearance)

“Tenting” is defined as the elevated appearance of the grafts above the surrounding skin surface and is more noticeable under direct light. The causes of tenting remain a dilemma but are probably related to too-superficial placing of the grafts. Overgrowth of the epithelium during the healing process may also play a role (Fig. 12) [2].

Prevention of Tenting

It is impossible to predict the occurrence of tenting. The following precautions may help to minimize this condition.

Fig. 12. Tenting

1. Create slits appropriately the same size as the grafts.
2. Check for graft elevation caused by popping-out or too-superficial planting at the end of the insertion and correct accordingly.
3. Attention must be given to cases with a large difference in the thickness between recipient and donor skin.
4. Make acute-angle incisions when placing the grafts into very thin recipient skin.

Correction of Tenting

1. Most cases will improve with time.
2. Add on density by follicular unit transplantation to camouflage the tents. The grafts should be placed deeper than in the previous session. An additional session is expected as a large quantity of grafts is usually required.
3. Any of the following can also be considered when tenting has not resolved with time:
 - Dermabrasion
 - Laser resurfacing
 - Electro-cautery
 - Topical steroid ointment of moderate potency
 - Low-dose steroid injection

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References

1. Cooley JE (2005) Dilemmas in hair restoration. *Hair Transplant Forum Int* 15:207–208
2. Imagawa K (2008) Pitting and tenting. *J Jpn Soc Aesthetic Reconstruct Surg* 30:98–103 (in Japanese)