بسم الله الرحمن الرحیم

COMMON POSTOPERATIVE COMPLICATIONS OF HAIR TRANSPLANTATION

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TUMS

- DONOR AREA COMPLICATIONS
- RECIPIENT AREA COMPLICATIONS

DONOR AREA COMPLICATIONS

- **Arteriovenous Fistulas**
- **Visible Scarring**
- **Keloid and Hypertrophic Scarring**
- **Donor-Hair Effluvium**

Arteriovenous Fistulas

- In rare cases, patients complain of a postoperative throbbing sensation near the donor wound, and an examination reveals a pulsating subcutaneous lump or nodule.

- Such clinical findings usually resolve spontaneously within **six months**, but superficial vessels can be ligated if the surgeon is concerned about vessel rupture or cosmetic appearance.

Visible Scarring

- Visible scarring in the donor area is the most **common patient complication** encountered in hair transplantation.
- It is impacted in equal measure by scar burden and the ability to camouflage scar tissue;
  - A large scar might be easily hidden within the middle of dense donor hair, whereas a fine one might be obvious in sparse hair at the periphery of the donor region.

- For strip harvesting, visibility is predominantly influenced by the **number** and **width** of scars.
- With multiple surgeries, the temptation is to maximize donor yield by harvesting from virgin donor regions. This dramatically increases the number of scars.
- In contrast, when existing scar is removed with new donor strips, it is possible to leave a single scar despite multiple surgeries.

- The **width** of scars is a more difficult variable to influence, as demonstrated by the occurrence of abnormally wide scarring despite ideal surgical technique.
- Certain factors, however, are within the surgeon's control.
- A **higher donor zone**, for example, is less likely to produce wide scars than one near the nape of the neck.
- More importantly, **low wound tension** reduces the incidence of wide scarring.

- Unfortunately, identifying the borders of the permanent donor rim is an uncertain science, especially in younger patients.
- The wider the zone of harvesting, the more likely that it crosses these boundaries.
- This is the principle drawback of follicular unit extraction (FUE), since a large donor area is needed to obtain reasonable numbers of grafts.
- Similarly, this is the disadvantage of excising donor strips from multiple virgin areas of the scalp, since the location of these strips invariably migrates away from the densest donor hair.

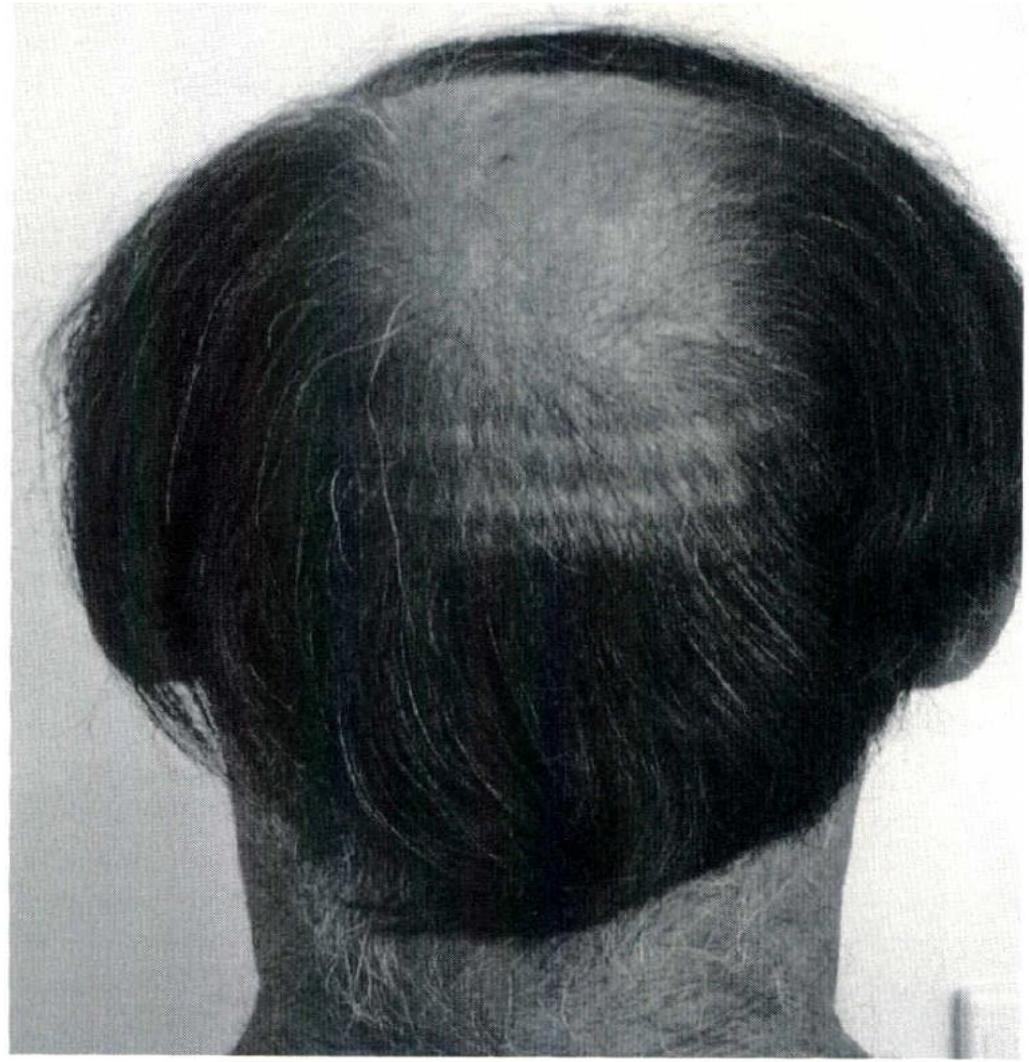

Figure 14B-1 This patient had visible donor scarring due to previous harvesting from non-permanent donor regions. The risk increases with the excision of donor strips from multiple virgin areas of the scalp, since by necessity such regions are progressively farther from the densest donor hair. In addition to donor scarring, the appearance of these scars indicates that transplanted recipient hair is impermanent.

- While **prevention** is the key to limiting scar visibility, a range of corrective measures are available to treat unsightly scarring, particularly as it applies to strip harvesting.

- If there are multiple scars, one way to improve the appearance is by simultaneously excising two closely spaced scars, thus converting them into a **single scar**.

- A different option is to surgically revise individual scars that are atypically wide.

- To achieve this aim, **multiple sequential excisions** over time may be preferable to a single, wide excision that might produce **tension**.

- In addition, infiltrative and systemic **corticosteroids** should be administered, as these will reduce edema, thereby minimizing postoperative wound tension.

- Physicians might consider closing the wound using a **trichophytic** technique, since this will partially conceal scar visibility.

- Lastly, they may consider locally infiltrating **botulinum toxin**, which has shown promise in decreasing scarring, presumably by reducing the wound tension created from multiple muscular vectors.

- If wide scarring persists despite the above measures, then an entirely different approach is to **place follicular units within the scar**.

- These can be obtained from strip excision, or from scalp or body FUE.

- A final option, if this too fails, is to **tattoo the skin** to match the color of the hair.

Figure 14B-2 Regions between linear scars are prone the loss of hair, as the vascular supply is cut from both above and below. This can give an impression that scars are wide.

- Correcting scar visibility that results from **poor donor density** is far more difficult than correcting scar burden.
- If the scar is visible because it was **created in an area of non-permanent donor hair**, then hair can be grafted into the area, provided that the grafts are not needed in more cosmetically important areas.
- On the other hand, if scarring is visible because of **over-harvesting**, the only possible solutions are **body-to-scalp transplanting** and **cosmetic preparations such as Toppik**.

Keloid and Hypertrophic Scarring

- Keloid and hypertrophic scarring are rare occurrences in hair transplantation.

- Keloid scarring is recognized by the presence of pruritic, tender, irregular, and elevated scar tissue that extends beyond the boundaries of the original skin wound.

- It occurs more frequently in **younger** individuals with **darker skin tones**, particularly **Asians**, **Blacks**, and **Hispanics**.

- **Excessive inflammation**- caused by **infection**, **foreign material**, or **excessive wound tension**-is an important trigger.

- Keloid scarring usually develops **months** or **years** after surgery, and **persists indefinitely**.

- In contrast, hypertrophic scars are **asymptomatic** and **confined to the boundary** of the original wound.

- Typically, they develop **weeks** or **months** after surgery, and **resolve spontaneously** over years.

- **Darker** skin pigmentation is not a risk factor.

- Individuals with a history of keloid scarring are not candidates for hair restoration surgery.

- Those with a high risk of developing keloids, due to ethnicity and age, or with a personal history of hypertrophic scarring, should be informed of the potential for abnormal scarring.

- In the unfortunate event that either type of scarring occurs, the first-line therapy is **intralesional triamcinolone acetonide**, 10 to 40mg per ml, every six weeks.

- The second-line therapy is **silicone elastomer sheeting**, which functions by increasing the temperature, hydration, and oxygen tension of occluded scars, causing them to soften and flatten.

- Unfortunately, sheeting is difficult to apply in the hair-bearing scalp.

- If neither of the above approaches is effective over a **12-month** period, then **debulking surgery** can be attempted.

- While surgical monotherapy works well for hypertrophic scars, keloids invariably reoccur.

- Consequently, **concurrent corticosteroid injections** and **silicone sheeting** are needed postoperatively.

- Alternatively, **postoperative radiation therapy** will reduce keloid recurrences

Donor-Hair Effluvium

- While **recipient-hair effluvium** is a relatively common occurrence, especially in **females**, donor-hair effluvium is significantly less common.

- It usually presents within **six weeks of surgery** as temporary hair loss along the inferior and superior margins of linear wounds, or as diffuse hair loss in the case of FUE.

- Most likely it is a consequence of **anagen effluvium**, in response to interrupted blood supply.

- Unsurprisingly, the **risk is heightened** when harvesting from donor tissue bordered by scar tissue, or when major neurovascular bundles are accidentally transected.

- Patients should be reassured that the problem **spontaneously resolves** within **three to four months**, but **minoxidil** can hasten hair regrowth.

Figure 14B-3 The risk of donor effluvium is heightened when donor tissue is harvested from an area bordered by scars. In this case, the patient presented a month after surgery with diffuse shedding beneath the incision. Originally, he had a total of four linear scars in the right occipital region. Ideally, the two upper scars would have been simultaneously excised, leaving an intact blood supply superiorly. However, since the width between them was too great, the two middle scars were excised instead, disrupting the blood supply from both sides.

RECIPIENT AREA COMPLICATIONS

- Central Recipient Area Necrosis
- Folliculitis
- Unnatural Appearance
- Poor Density

Central Recipient Area Necrosis

- Central recipient area necrosis is an uncommon, but **serious complication** that develops following hair transplantation in the frontal or midscalp regions.

- It is characterized by a **dusky scalp discoloration**, followed by extensive, persistent postoperative **crusting** in the midfrontal scalp, and the **formation of an eschar**.

- The eschar eventually detaches, leaving an area of **cicatricial alopecia**.

Figure 14C-1 Vascular compromise resulting in necrosis in the frontal recipient area.

- The cause of central recipient area necrosis has not been elucidated, but the scalp has a **centripetal blood supply**, meaning that it flows **superiorly and medially**, and the affected area is a watershed for the **most distal branches of this supply**.
- This has led to the suggestion that it develops secondary to **vascular compromise**.
- Lending support to this theory is the finding that conditions associated with vascular damage -smoking, diabetes mellitus, prior scalp surgery, scarring, and actinic damage- predispose individuals to this complication.

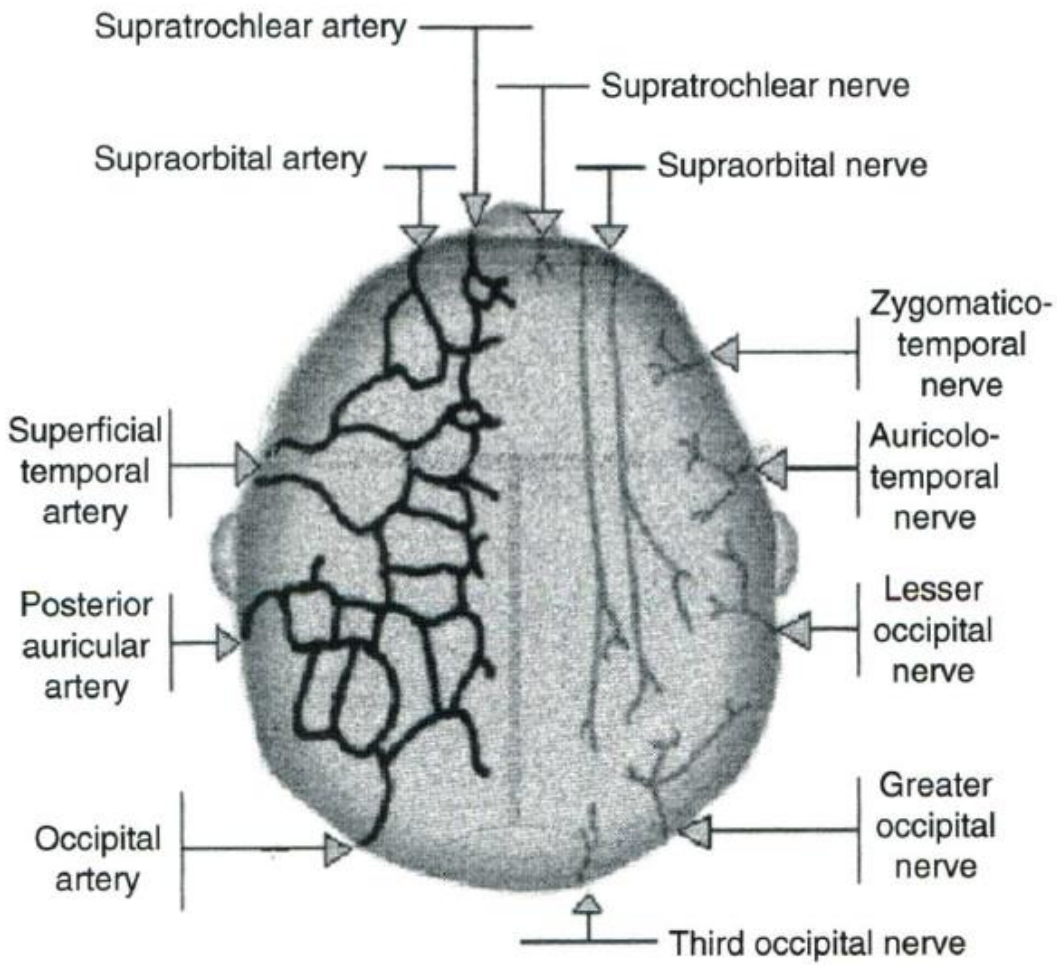

Figure 1B2-2 Neurovascular anatomy of the scalp.

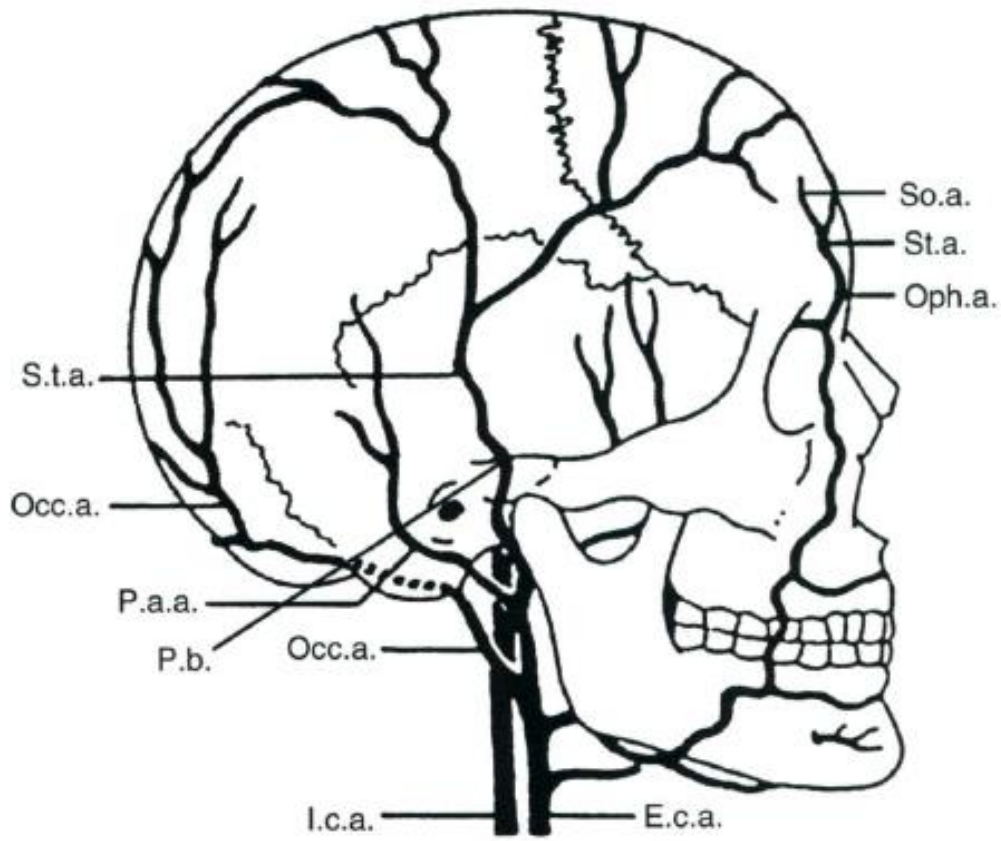

Figure 1B1-3 Diagram of the arterial network in the scalp. Five-paired arteries travel in the subcutaneous layer. In the lateral scalp: external carotid artery (E.c.a.) (three branches): (*i*) superficial temporary artery frontal (S.t.a.) (transverse facial), parietal branch (P.b.) (middle temporal); (*ii*) postauricular artery (P.a.a.); (*iii*) occipital artery (Occ.a), internal carotid artery (I.c.a.); (*iv*) supratrochlear (St.a); (*v*) supraorbital (So.a), ophthalmic artery (Oph.a.).

- Given the presumed **vascular etiology** of central recipient area necrosis, the **prevention** of this complication is focused on **limiting vascular disruption**, especially in patients with multiple vascular risk factors.

- In the donor area, particularly in the temporal fringe, the **preservation of the neurovascular supply** is of paramount importance.

- In the recipient area, this can be done by making recipient sites as **superficial** as possible, and by considering limiting the **number** and **density** of incisions.

- Other practitioners have suggested that the complication could be prevented by decreasing the use of **high concentrations and volumes of epinephrine** in the recipient area, and by **using saline tumescence** in the recipient area, in order to protect deeper vessels from incisional trauma.

Folliculitis

- Folliculitis is used to describe **hair follicle inflammation** in response to **infection**, **physical injury**, or **chemical exposure**.
- The reported incidence of postoperative folliculitis in hair transplantation varies from **1.1% to 20%**,
- Severity ranges from a **mild**, superficial inflammation with mild erythema and scattered pustules, to a **severe**, deep inflammation with widespread erythema and numerous cysts, pustules, and papules.
- The infection can occur in either the **recipient** or donor area, but it is more **common** in the former.

- Folliculitis after hair transplantation can occur due to any of the aforementioned factors, and an astute practitioner should consider all the **three** possibilities.
- In cases of **severe** folliculitis, a component of the etiology is usually **infectious**.
- A **milder** folliculitis, however, can be precipitated by the egress of hair shafts through the epidermis.
- This occurs more frequently if multiple grafts are accidentally placed on top of one another in a single recipient site, if grafts are placed too deeply, or if grafts contain hair fragments below the level of the epidermis.
- It appears that a **mild** folliculitis may also occur in response to topical **minoxidil**.

- The treatment of folliculitis depends on the underlying cause.
- When a **mild** folliculitis begins **two to three months postoperatively**, **hair growth** is the probable cause.
- In such cases, the initial treatment is **warm compresses for 15 minutes** three times daily, and a **topical antibiotic ointment such as mupirocin**.
- If a mild folliculitis is associated with minoxidil use, then it should be **stopped**, and a **topical mid potency corticosteroid prescribed**.

- Finally, if **infection** is suspected, as in the case of an early folliculitis or a severe folliculitis occurring at any time, then treatment includes:
  - ✓**Warm compresses**
  - ✓**Topical antibiotic ointments**
  - ✓The **incision and drainage of purulent collections**
  - ✓The **administration of systemic antibiotics**

- In rare cases, patients may suffer from **chronic recipient area inflammation**.
- In such cases, the diagnosis should be reconsidered and a **biopsy** performed, since infectious folliculitis may mimic inflammatory processes such as **folliculitis decalvans**.
- Once the diagnosis is confirmed, physicians should rule out habits that might predispose the patient to folliculitis, such as :
  - **dusty work** environments
  - **infrequent scalp washing**
  - **immunosuppressive medical conditions** such as diabetes mellitus

Unnatural Appearance

- The unnatural appearance of transplanted hair may be due to :
  - **Hair pattern**
  - **Hair direction**
  - **Hair characteristics**
  - **Perifollicular skin surface abnormalities**

- With respect to hair characteristics, transplanted hair may initially appear coarse, wiry, or lusterless.
- This corresponds to observable abnormalities in hair shaft cuticles.
- One hypothesis is that these abnormalities occur when **hair follicles are bent during graft insertion**, as would be the case with superficial recipient sites.
- The condition usually spontaneously resolves **within 12 months**, but **hair conditioners** or a mild hair relaxer can improve the appearance.

- Perifollicular skin surface abnormalities include:
  - tenting
  - pitting
- Tenting occurs if **grafts are placed too superficially**, due to either **incorrect planting technique** or **inadequate incisional depth**.
- Alternatively, tenting may occur if the **epidermis surrounding grafts is inadequately trimmed**.
- In contrast, pitting occurs if grafts are placed below the skin surface.

Poor Density

- Poor density is both a **subjective** and **objective** problem that can result from:
  - Inappropriate patient expectations
  - Suboptimal graft distribution
  - Poor graft survival
- The **subjective** element of this problem is avoided when physicians accurately describe the expected result from hair transplantation.
- If a patient has unreasonable expectations, then the best course of action is to delay surgery.

- If density is truly poor, it may be due to **suboptimal graft distribution**: the **spacing between grafts may have been too large**, or the **wrong size follicular unit** may have been used in key areas.

- To create a dense appearance, both the **frontal egg** and the **side from where hair is parted** should contain a maximum density of hairs.

- This is achieved by **increasing** both incisional density and the size of follicular units.

- Alternatively, poor density can occur if there is **poor graft survival**.

- In patients with **vascular disease** or **multiple previous scalp surgeries**, **decreased recipient area vascularity** may diminish graft survival.

- Graft survival:
  - ✓Donor harvesting technique
  - ✓Recipient site size
  - ✓Recipient size density
  - ✓Graft size
  - ✓Graft handling
  - ✓ Postoperative care (for example, patients may traumatically dislodge grafts by scratching, combing, or aggressive shampooing.)


Thank you!


Any
Questions?