



## **Post-Hair Transplant Complications: A Review of Best Practices for Prevention**

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**ABSTRACT:**

*Hair transplantation has grown into a cornerstone solution for patients seeking permanent relief from baldness or hair thinning. However, despite technological advances and the increased precision of surgical techniques, complications can still occur. This article offers a comprehensive review of post-hair transplant complications while examining the best practices for their prevention. Each complication is discussed with respect to its underlying causes, clinical presentation, and specific preventive strategies, making this a practical guide for both novice and experienced hair restoration professionals.*

**Introduction**

Hair restoration surgery, particularly hair transplantation, has become one of the most frequently performed cosmetic procedures globally. The increasing prevalence of androgenetic alopecia, psychological distress associated with hair loss, and evolving social standards of appearance have led to a significant demand for surgical hair restoration. Techniques such as Follicular Unit Transplantation (FUT) and Follicular Unit Extraction (FUE) have revolutionized the field by providing natural-looking results and minimally invasive alternatives to traditional surgical approaches. While patient satisfaction is generally high when these procedures are executed skillfully, post-transplant complications can undermine aesthetic outcomes and compromise graft survival.

Despite its classification as a low-risk outpatient surgery, hair transplantation involves manipulation of living tissue, which naturally invites inflammatory, infectious, and vascular responses. Early complications may manifest within days of surgery, while others can emerge weeks or even months later. Complications can result from improper technique, inadequate postoperative care, or individual patient predispositions. Moreover, aesthetic concerns like shock loss and uneven hair regrowth can lead to dissatisfaction, even in the absence of medical complications. Understanding the biology of hair follicles, scalp vascularity, and healing mechanisms is essential to minimizing these outcomes. Prevention, rather than management, must be the primary goal of the modern hair transplant surgeon.

This article categorizes complications into early and late onset, explains the pathophysiological mechanisms

behind each, and suggests evidence-based practices for prevention. Clinical cases are also included to illustrate how complications manifest and how they may be effectively addressed.

## Common Postoperative Complications

### Early-Onset Complications (0–14 Days Post-Operation)

Edema is one of the most commonly observed complications in the initial days following a hair transplant. It typically presents as swelling in the forehead, periorbital region, and sometimes down to the cheeks. The condition is primarily due to the infiltration of tumescent fluid and the trauma inflicted on lymphatic and vascular structures during the surgical process. Preventive measures include elevating the patient's head at a 30–45-degree angle during the first few nights post-surgery to encourage fluid drainage. The use of corticosteroids, either systemically or topically, can also help reduce inflammation. Gentle surgical handling and limiting the amount of tumescence injected during the procedure can further minimize the risk.

Hematoma and bleeding are results of inadequate hemostasis during the harvesting or implantation stages. They may appear as localized swelling or discoloration and can be uncomfortable for the patient. Although small hematomas resolve on their own, larger ones may require drainage. Bleeding prevention begins intraoperatively with meticulous control of vascular oozing using bipolar cautery or compression. Preoperative screening to avoid blood-thinning medications like aspirin, non-steroidal anti-inflammatory drugs, and certain supplements is essential. Postoperatively, patients should be advised to avoid strenuous activity and bending forward, both of which can increase venous pressure and lead to bleeding.

Pain and discomfort are usually self-limiting but may become significant in patients with low pain thresholds or poor anesthetic technique. Pain is primarily due to microtrauma to the skin, subcutaneous tissue, and periosteum in the donor and recipient areas. Adequate local anesthesia and preoperative counseling regarding expected discomfort levels can improve patient tolerance. Postoperative analgesics such as acetaminophen or NSAIDs may be used cautiously to relieve pain, ensuring that they do not interfere with clotting or healing.

Infection remains a rare but serious complication. It typically presents with redness, swelling, pain, warmth, and sometimes purulent discharge from the donor or recipient areas. In severe cases, systemic symptoms like fever may develop. The primary cause of infection is a breach in sterile surgical protocol or inadequate wound care by the patient. Preventive strategies include the use of prophylactic antibiotics, sterile draping, and a clean

operating environment. Postoperatively, patients must be instructed to avoid touching the scalp with unclean hands and to follow a strict cleaning regimen as advised by the surgeon.

### **Late-Onset Complications (2–12 Weeks Post-Operation and Beyond)**

Folliculitis refers to inflammation of the hair follicles and usually appears as small, red or pus-filled bumps in the recipient area. It can be caused by bacterial infection, ingrown hairs, or blockage of follicles due to sebum and dead skin cells. It is most common between 2 to 6 weeks post-surgery when new hair begins to emerge. Prevention involves advising patients to gently wash their scalp after the initial healing phase to prevent buildup. Topical antiseptics or antibiotics such as mupirocin may be prescribed if signs of infection appear. If inflamed pustules develop, warm compresses can help drain them naturally without disturbing the grafts.

Shock loss refers to the shedding of pre-existing or even newly implanted hair within a few weeks after the transplant. It occurs due to trauma or vascular insufficiency caused during graft placement. This temporary hair loss is often distressing to patients, although regrowth usually occurs within 3 to 6 months. Surgeons can reduce the risk by using refined techniques that minimize trauma and avoid excessive density in one area. Pre- and postoperative application of low-dose minoxidil has been shown to reduce the incidence of shock loss by improving follicular health and blood supply.

Scarring and keloid formation are particularly concerning in individuals with a predisposition to abnormal wound healing. FUT procedures, which involve linear excision of scalp tissue, can result in visible scars if not closed properly. In FUE, multiple small punches can leave dot-like scars, which are usually less conspicuous. The risk of hypertrophic scarring or keloid formation is higher in individuals with darker skin tones or a history of keloids. Prevention includes tension-free suturing, precise donor area closure, and consideration of FUE in high-risk individuals. Silicone sheets or corticosteroid injections may be employed if abnormal scarring begins to develop.

Cysts are small, firm nodules that may form in the recipient or donor areas weeks after the transplant. They usually occur when a graft is placed too deeply or improperly, causing skin epithelium to be buried under the surface. This leads to a foreign body reaction. Small cysts often resolve on their own but can become inflamed or infected. Prevention involves careful graft insertion at the appropriate depth and angle to avoid epithelial inclusion. Persistent cysts may require needle aspiration or minor surgical excision.

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## Psychological and Aesthetic Complications

Beyond physical symptoms, hair transplant patients may experience psychological distress due to unmet expectations. Unrealistic expectations are a leading cause of dissatisfaction despite technically successful outcomes. This often results from poor communication during the consultation process. Surgeons must conduct a thorough assessment of hair loss progression and explain achievable goals in a clear, empathetic manner.

Additionally, uneven growth patterns can lead to aesthetically displeasing results. This may happen when grafts are placed at incorrect angles or inconsistent densities. Preventive strategies include using magnification tools during graft insertion, designing a natural hairline, and adhering to a consistent density pattern. When necessary, follow-up procedures may be planned to refine the results over time.

## Best Practices for Prevention

Preoperative Measures are crucial in minimizing postoperative complications. A comprehensive medical evaluation can identify conditions that may impair healing or increase bleeding risk, such as diabetes or coagulopathies. The patient should be advised to avoid smoking, alcohol, and anticoagulant medications for at least 7 days prior to surgery. Proper planning, including donor area assessment and hairline design, ensures realistic goals and a natural aesthetic.

Surgical Techniques should prioritize precision and atraumatic handling of grafts. The use of sharp punches and implanters, magnifying loupes, and trained surgical assistants significantly reduces tissue trauma. The time grafts spend outside the body should be minimized and kept in chilled physiological saline or platelet-rich plasma to maintain viability. Maintaining graft density below 40 FU/cm<sup>2</sup> helps to avoid ischemic complications.

Postoperative Care plays an equally important role. Patients should be provided with a detailed instruction sheet regarding cleaning, sun protection, and restrictions on physical activity. Prescribed medications should include antibiotics, anti-inflammatory drugs, and hair growth enhancers like minoxidil or biotin supplements. Regular follow-up ensures early detection and prompt treatment of any emerging complications.

Patient Education empowers individuals to actively participate in their recovery. By explaining the natural phases of hair growth—anagen, catagen, and telogen—patients are less likely to panic during the temporary shedding phase. Encouraging realistic timelines for visible results (typically 6 to 12 months) is also essential for psychological reassurance.

## Case Studies

### Case 1: Postoperative Folliculitis

A 32-year-old male presented with multiple pustules in the recipient area on day 10 after an FUE procedure. Clinical examination confirmed folliculitis. The patient was treated with topical clindamycin and warm compresses, resulting in complete resolution within one week. Education on proper scalp hygiene was reinforced to prevent recurrence.

### Case 2: Keloid Formation

A 45-year-old African-American male developed a raised, linear scar in the donor area following FUT. He had a known history of keloid formation. Treatment with silicone gel and monthly intralesional corticosteroid injections led to partial flattening over three months. Subsequent procedures were planned using the FUE method to avoid further scarring.

**Table 1: Classification of Postoperative Complications by Onset and Type**

Time Frame	Medical Complications	Aesthetic Complications	Psychological Complications
<b>0–14 Days (Early)</b>	Edema, Bleeding, Hematoma, Infection, Pain	–	Anxiety related to post-op appearance
<b>2–12 Weeks (Late)</b>	Folliculitis, Shock Loss, Scarring, Cysts	Uneven growth, patchiness	Disappointment over initial results
<b>&gt;3 Months (Delayed)</b>	Persistent cysts, Keloids	Poor hairline design, low density outcomes	Regret due to unmet expectations

**Table 2: Common Complications and Their Preventive Measures**

Complication	Cause	Prevention Strategy
Edema	Lymphatic disruption, fluid accumulation	Head elevation, corticosteroids, limited tumescence
Bleeding/Hematoma	Inadequate hemostasis, blood thinners	Surgical precision, pre-op medication review, post-op rest
Infection	Poor hygiene, non-sterile technique	Aseptic surgery, antibiotics, scalp cleaning instructions
Folliculitis	Clogged follicles, bacterial invasion	Early washing, topical antibiotics, avoid tight headgear
Shock Loss	Graft trauma, vascular disruption	Minoxidil use, careful handling, spacing of grafts
Scarring/Keloids	Individual predisposition, tension closure	FUE in high-risk patients, silicone sheets, steroid injections
Cysts	Buried epithelium, deep implantation	Proper implantation depth and angle

**Table 3: Surgical Techniques Comparison for Risk of Complications**

Parameter	FUT (Strip Method)	FUE (Punch Extraction)
Donor Site Scar	Linear, more visible	Dot-like, less noticeable
Risk of Keloid	Higher	Lower
Postoperative Pain	Moderate to high	Mild
Graft Survival Rate	High	Slightly variable
Risk of Cyst Formation	Moderate	Low
Healing Time	Longer (10–14 days)	Shorter (5–7 days)

**Table 4: Recommended Postoperative Care Protocol (First 14 Days)**

Day Post-Surgery	Recommended Action
Day 1–3	No washing, avoid touching graft area, sleep with head elevated
Day 4–7	Begin gentle washing with mild shampoo, avoid direct water pressure
Day 8–10	Resume normal cleansing, avoid strenuous physical activity
Day 11–14	Inspect for folliculitis or infection, apply topical agents if prescribed

## Conclusion

Hair transplant surgery is a refined, reliable method for addressing hair loss, offering both aesthetic and psychological benefits. Nevertheless, the occurrence of postoperative complications can detract from the success of the procedure. By implementing structured preoperative screening, advanced surgical techniques, and diligent postoperative care, clinicians can significantly reduce the risk of complications. Ongoing education, both for practitioners and patients, remains the cornerstone of safe and effective hair transplantation.

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