

A comparative study between full-thickness and partial thickness skin grafts in the reconstruction of nasal defects

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Abstract

Reconstructing nasal skin defects presents a significant challenge for reconstructive and plastic surgeons, necessitating careful selection of techniques to achieve satisfactory functional and aesthetic outcomes. This study compared the efficacy of full-thickness skin grafts (FTSGs) and split-thickness skin grafts (STSGs) in addressing nasal skin defects among 19 patients. Patients were divided into two groups: 11 received FTSGs, while 8 underwent reconstruction with STSGs. Results demonstrated that FTSGs exhibited significantly higher graft viability at both 5- and 30-days post-surgery compared to STSGs, despite slightly longer operative duration, though the difference in duration was not statistically significant. Both techniques showed comparable safety profiles, with no significant differences in postoperative complication rates or the need for blood transfusions. The superior performance of FTSGs is attributed to their inclusion of the complete dermal layer, which enhances vascularization and integration with recipient tissues—critical factors for successful outcomes in the functionally and aesthetically sensitive nasal region. However, STSGs may remain a viable option in specific scenarios, such as smaller defects or limited donor-site availability, owing to their faster donor-site healing. This study underscores the prioritization of FTSGs for nasal reconstruction, particularly in cases demanding high-quality functional and aesthetic results, while emphasizing the need for individualized decision-making based on patient-specific characteristics and defect complexity. Nonetheless, larger studies with extended follow-up periods are warranted to evaluate long-term outcomes, including aesthetic satisfaction, patient-reported quality of life, and cost-effectiveness of the two techniques.

Keywords: Reconstructive surgery, Full-thickness skin grafts, Split-thickness skin grafts, Graft viability, Nasal skin defect



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Introduction

Nasal skin defects pose a significant challenge in reconstructive and plastic surgery due to their complex anatomical and aesthetic considerations.[1,2] While various techniques exist for nasal reconstruction, skin grafts remain a widely utilized option.[3] This prospective study aimed to evaluate the efficacy of full-thickness skin grafts (FTSGs) versus split-thickness skin grafts (STSGs) in reconstructing nasal defects among 19 patients treated at Al-Lattakia University Hospital between 2022 and 2023. Graft viability and outcomes were assessed postoperatively on days 5 and 30, with comparisons drawn between the two techniques. The findings highlight the superior viability of FTSGs, offering insights into optimizing reconstructive strategies for nasal skin defects while balancing operative efficiency and patient safety.

The nose, as the central feature of the face, carries profound functional and aesthetic significance. Its prominent position makes it highly susceptible to ultraviolet (UV) radiation, trauma, and malignancies[4].

Anatomically, nasal skin varies in thickness, texture, and sebaceous content across subunits (e.g., dorsum, sidewalls, alae, tip), necessitating tailored reconstructive approaches[5,6]. Defects arising from tumor resections, trauma, or burns require meticulous planning to restore form and function while minimizing complications[7].

Background: Nasal Skin Lesions

Anatomical Characteristics

The nose comprises distinct aesthetic subunits: dorsum, sidewalls, tip, alae, and soft triangles[8]. Skin thickness ranges from thin and mobile over the upper two-thirds to thick and sebaceous at the tip and alar margins[9]. This heterogeneity influences reconstructive choices, as grafts must match local texture, color, and contour. The concept of "subunit principle" guides reconstruction; defects >50% of a subunit warrant complete subunit replacement[10].

Common Pathologies

1. Non-Malignant Tumors:

- *Fibrous Papule*: Benign lesions (1–5 mm) on nasal alae/tip, often mimicking basal cell carcinoma (BCC)[11].
- *Sebaceous Hyperplasia*: Yellowish papules with central umbilication, prevalent in immunosuppressed patients[12].
- *Rhinophyma*: Severe rosacea variant causing nasal hypertrophy, primarily in elderly males[13].

2. Malignant Tumors:

- *Basal Cell Carcinoma (BCC)*: Most common nasal malignancy (90% of head/neck skin cancers), linked to UV exposure[14].
- *Squamous Cell Carcinoma (SCC)*: Aggressive lesions with metastatic potential, often arising from actinic keratoses[15].
- *Melanoma*: Rare but lethal; nasal melanoma has a 5-year survival of 95.6% for early-stage disease[16].

Reconstruction Techniques

Primary Closure

Direct closure is feasible for small defects but risks distorting nasal contours due to limited tissue mobility[17]. Horizontal closures may elevate the nasal tip, while longitudinal closures create conspicuous scars[18].

Healing by Secondary Intention

Ideal for superficial defects in concave areas (e.g., inner canthus, alar groove)[19]. Advantages include simplicity and early detection of tumor recurrence. Disadvantages involve prolonged healing and contour flattening[20].

Skin Grafts

Full-Thickness Skin Grafts (FTSGs):

- Include epidermis and entire dermis.
- *Advantages:* Superior color/texture match, minimal contraction.
- *Disadvantages:* Require vascularized bed; higher risk of necrosis in large defects[21].

Split-Thickness Skin Grafts (STSGs):

- Contain epidermis and partial dermis.
- *Advantages:* Faster donor-site healing, viable for larger defects.
- *Disadvantages:* Poor aesthetic outcome (shiny, discolored), significant contraction[22].

Composite

Grafts:

Combine skin/cartilage (e.g., from ear). Used for full-thickness alar defects but limited to ≤ 1 cm due to vascular constraints[23].

Flaps

- **Local Flaps (e.g., bilobed, rhombic):** Ideal for small defects, leveraging adjacent tissue laxity[24].
- **Regional Flaps (e.g., forehead, nasolabial):** For larger defects; forehead flaps provide excellent match but require staged procedures[25].

Materials and Methods

Study Design

A prospective comparative study (2021–2023) included 19 patients with nasal defects requiring reconstruction at Al-Lattakia University Hospital. Patients were divided into:

- **Group 1 (n=11):** FTSGs.
- **Group 2 (n=8):** STSGs.

Inclusion/Exclusion Criteria

- **Inclusion:** Defects reconstructed with FTSGs/STSGs.
- **Exclusion:** ICU patients, immunosuppression, chemotherapy/radiotherapy history, chronic diseases impairing healing.

Outcomes Assessed

1. Graft viability (days 5 and 30).
2. Operative time, hospital stay, complications.
3. Patient satisfaction.

Statistical Analysis

Data analyzed using SPSS v26. Continuous variables (mean \pm SD) compared via t-tests; categorical variables (frequencies, %) via χ^2 tests. Significance: $p < 0.05$.

Results

Patient Demographics

- **Mean age:** 59.16 \pm 6.8 years.
- **Sex:** Males 68.4% (n=13), females 31.6% (n=6).
- **Defect etiology:** Malignancies (57.9%), trauma (26.3%), burns (15.8%).
- **Defect location:** Dorsum (47.4%), sidewall (36.8%), tip/ala (15.8%).
- **Defect size:** FTSG group (1.2 cm²), STSG group (2.4 cm²; $p=0.038$).

Surgical Outcomes

- **Operative time:** FTSG (29 min), STSG (27.4 min; $p=0.37$).
- **Graft viability (day 5):** FTSG 90.9% (n=10), STSG 37.5% (n=3; $p=0.001$).
- **Graft viability (day 30):** FTSG 90.9% (n=10), STSG 62.5% (n=5; $p=0.013$).
- **Complications:**
 - Overall: 36.8% (n=7).
 - FTSG: 18.2% (color change, contour irregularity).
 - STSG: 62.5% (infection, hemorrhage, contour irregularity; $p<0.05$).

Patient Satisfaction

- **FTSG:** 81.8% satisfied (n=9).
- **STSG:** 37.5% satisfied (n=3; $p=0.003$).

Discussion

FTSGs demonstrated significantly higher viability and patient satisfaction than STSGs, aligning with global studies[26,27]. The inclusion of the entire dermal layer in FTSGs enhances angiogenesis and integration, critical for nasal reconstruction[28]. STSGs, while suitable for larger defects or compromised patients,

exhibited higher complication rates and suboptimal aesthetics due to contraction and mismatched texture[29].

Key Findings

1. **Viability:** FTSGs' superiority persisted at 30 days, underscoring their resilience.
2. **Complications:** STSGs' higher infection/hemorrhage rates reflect their vulnerability in poorly vascularized beds.
3. **Aesthetics:** FTSGs provided better color/texture match, crucial for nasal subunits.

Comparative Literature

- **Brian et al. (2007):** FTSGs preferred for small defects due to superior aesthetics[30].
- **Goreshi (2016):** Forehead flaps with STSGs offer flexibility for large defects but lack FTSGs' aesthetic refinement[31].
- **Johnson (1992):** STSGs viable for extensive defects but carry higher recurrence and morbidity risks[32].

Limitations

Small sample size, single-center design, and short follow-up preclude long-term conclusions. Multicenter studies are needed to validate outcomes.

Conclusion

FTSGs are the gold standard for nasal reconstruction, offering higher viability, fewer complications, and superior aesthetics. STSGs remain an alternative for large defects or limited donor sites but should be avoided in cosmetically sensitive areas. Individualized approaches, considering defect size, location, and patient factors, are paramount.

Recommendations

1. Prioritize FTSGs for nasal defects.
2. Reserve STSGs for large defects or high-risk patients.
3. Explore local flaps for defects >2.5 cm.

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Tables and Figures

Table 1: Patient Demographics and Defect Characteristics

Variable	FTSG (n=11)	STSG (n=8)	p-value
Age (years)	60.36 ± 7.9	57.5 ± 5.07	0.37
Sex (M/F)	7/4	6/2	0.67
Defect Size (cm ²)	1.2	2.4	0.038*
Malignancy (%)	54.5	62.5	0.67

Table 2: Surgical Outcomes

Outcome	FTSG (n=11)	STSG (n=8)	p-value
Viability (Day 5)	90.9%	37.5%	0.001*
Complications	18.2%	62.5%	0.02*
Satisfaction	81.8%	37.5%	0.003*

Figure 1: Correlation between defect size, graft type, and complications

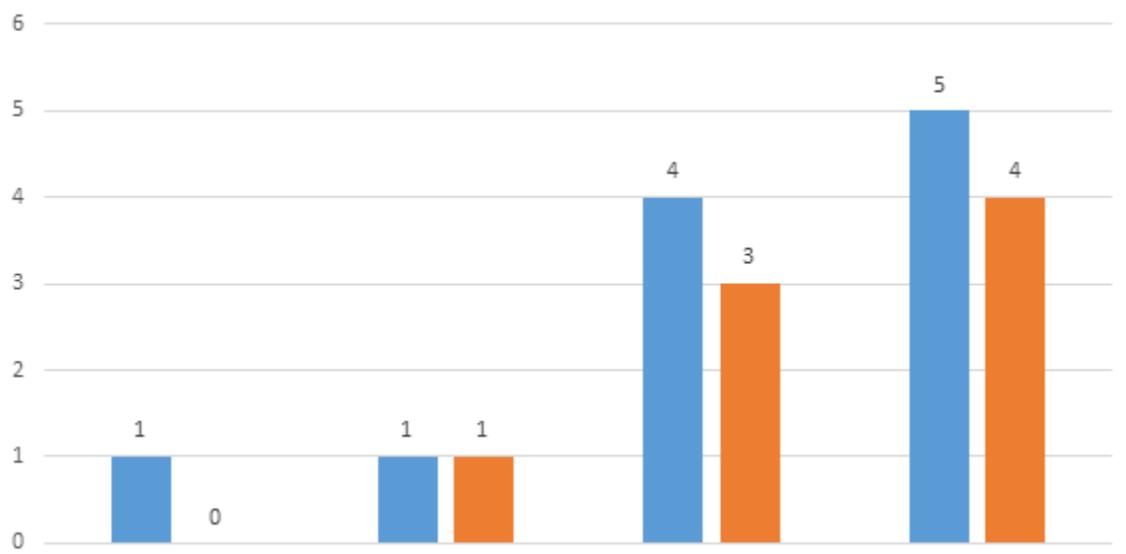


Figure 2: Graft Viability at Day 5 and 30.

(FTSG: 90.9% vs. STSG: 37.5% at day 5; $p < 0.05$)

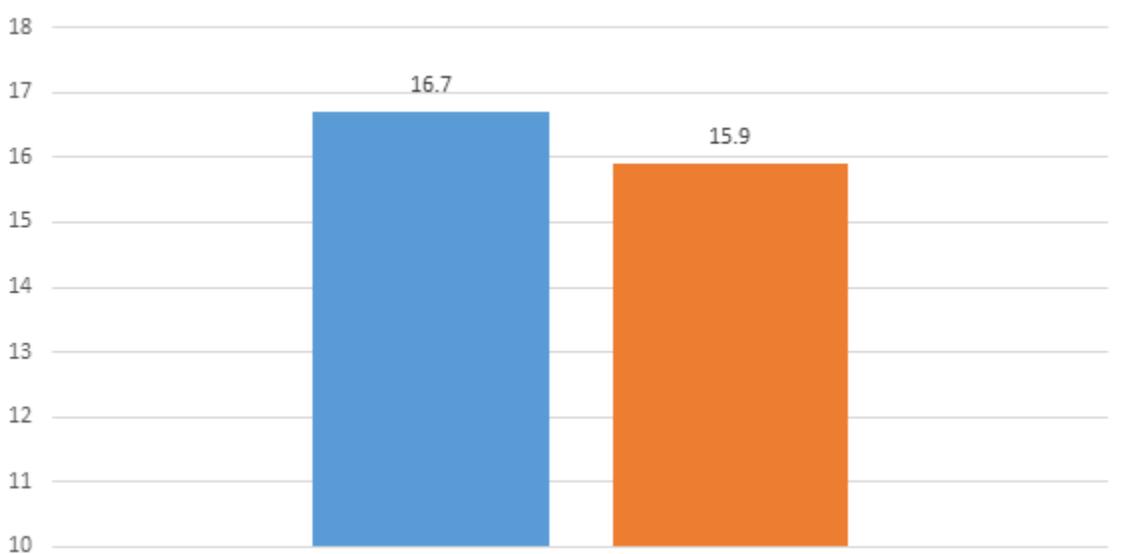
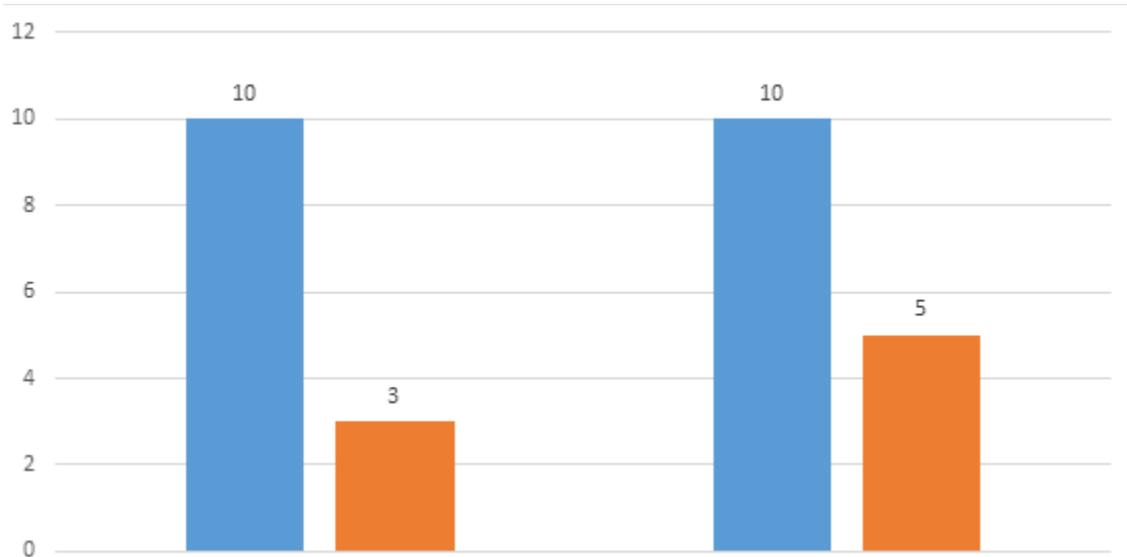


Figure 3: Complication Rates by Graft Type.

(STSG: Higher infection, hemorrhage, contour irregularities; $p < 0.05$)



Data Availability Statement

Data supporting results are archived at Al-Lattakia University Hospital. Access requires ethical approval.

Ethics Statement

Approved by Tishreen University Ethics Committee (Ref: 190-2025). Written informed consent obtained from all participants.

Competing Interests

None declared.

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Author Contributions

M.A.: Study design, data collection, manuscript drafting.

F.M.: Statistical analysis, manuscript revision.

M.I.: Surgical procedures, data interpretation.