

Facial Flaps in Plastic Surgery: A Concise Review of Types, Indications, and Outcomes

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ABSTRACT

Facial reconstruction represents a complex surgical challenge requiring restoration of both aesthetic appearance and functional integrity. Facial flaps are widely used in reconstructive plastic surgery because they allow replacement of damaged tissue with tissue that closely matches the surrounding skin in color, texture, and thickness. Over time, reconstructive techniques have evolved from simple local flaps to advanced approaches including perforator flaps, tissue-expanded flaps, and microvascular free flaps for extensive facial defects. Local flaps remain the first-line reconstructive option for many facial defects due to their reliability and favorable aesthetic outcomes. Regional flaps and combined local flap techniques can effectively reconstruct larger defects, particularly following oncologic resection. Perforator and free flaps have expanded reconstructive possibilities for complex or deep facial defects by providing large volumes of well-vascularized tissue with minimal donor-site morbidity. In addition, tissue expansion techniques allow the generation of additional local tissue that closely matches the facial skin. Current evidence suggests that flap reconstruction generally provides superior aesthetic outcomes compared with skin grafting in cosmetically sensitive facial areas. Appropriate flap selection depends on defect size, depth, anatomical location, and reconstructive goals. This review summarizes the main categories of facial flaps, their indications, and reported surgical outcomes in contemporary facial reconstruction.

KEYWORDS: Facial flaps; Facial reconstruction; Local flaps; Perforator flaps; Free flaps; Tissue expansion; Cervicofacial flap; Keystone flap; Plastic surgery.

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INTRODUCTION

Facial reconstruction requires careful restoration of both function and aesthetics, as the face contains complex anatomical structures responsible for expression, speech, mastication, and vision. Reconstruction must therefore restore structural integrity while maintaining facial symmetry and natural contours (1).

Facial flaps are widely used because they follow the principle of replacing tissue with tissue of similar characteristics. Compared with skin grafts, flaps offer superior vascular supply and better match in color, thickness, and texture, which is particularly important in cosmetically sensitive facial regions (2).

Advances in reconstructive techniques have expanded the range of available flaps, including local flaps, regional flaps, perforator-based flaps, and microvascular free flaps. These techniques allow surgeons to address a wide spectrum of defects, from small cutaneous lesions to extensive facial defects following trauma or oncologic surgery (3).

LITERATURE REVIEW

Local Facial Flaps

Local flaps remain the most commonly used reconstructive technique for small to moderate facial defects. Rotation, advancement, and transposition flaps allow the surgeon to

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mobilize adjacent tissue while maintaining excellent aesthetic integration with surrounding skin (1).

Advancement flaps are particularly useful when the defect lies along relaxed skin tension lines, allowing direct tissue movement with minimal distortion of adjacent structures (4). Rotation flaps, on the other hand, allow curved tissue movement to close triangular or irregular defects, particularly in the cheek and temple regions (1).

In recent years, the keystone perforator island flap has gained popularity for facial reconstruction because it combines the simplicity of local flaps with improved vascular reliability provided by perforator vessels (5). This technique has shown favorable functional and aesthetic outcomes in reconstruction of small to moderate defects.

Regional and Combined Local Flaps

Larger or multizonal facial defects may require regional flaps or combinations of multiple local flaps. Cervicofacial and cheek rotation flaps are commonly used for midface reconstruction and provide good color and texture match with surrounding tissues (6).

In some cases, large post-oncologic defects can be reconstructed using combinations of several local flaps, allowing reconstruction of multiple facial subunits while preserving natural contours and minimizing donor-site morbidity (7).

Forehead flaps remain a reliable option for reconstruction of large nasal and central facial defects, often combined with other reconstructive techniques to improve functional and aesthetic outcomes (8).

Perforator and Free Flaps

For extensive or deep facial defects, perforator-based free flaps and microvascular reconstruction may be required. Perforator flaps provide well-vascularized tissue with reduced donor-site morbidity compared with musculocutaneous flaps (9).

The anterolateral thigh (ALT) free flap has become a versatile option for large facial reconstructions because its thickness can be modified to match facial contours (10). Similarly, thickness-controlled perforator flaps allow surgeons to tailor tissue volume while maintaining reliable vascular supply (11).

These techniques are particularly useful for defects exceeding 40 cm² or involving deep structural components.

Tissue Expansion and Prefabricated Flaps

Tissue expansion techniques allow surgeons to generate additional local tissue that closely resembles facial skin in color and texture. Expanded neck and chest flaps can be used to reconstruct extensive facial defects with satisfactory aesthetic outcomes (12).

In extreme cases, prefabricated expanded thoracic flaps have been described for reconstruction of near-total facial soft tissue defects, demonstrating the potential of advanced reconstructive strategies for complex cases (13).



Figure 1. Local flap for basal cell carcinoma

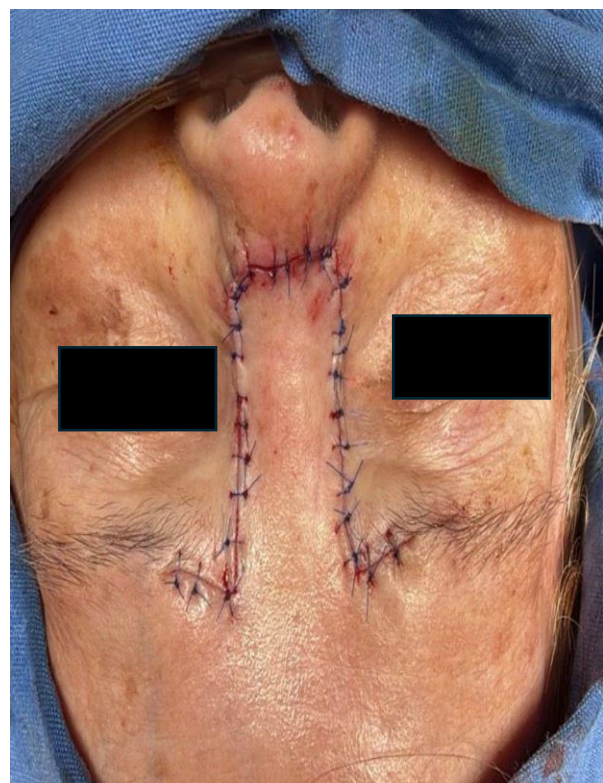


Figure 2. Rintala flap for basal cell carcinoma

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Flaps Versus Skin Grafts
 Comparative studies have shown that flap reconstruction generally produces superior cosmetic results compared with skin grafts, particularly in areas where color and contour matching are essential (2). While skin grafts remain useful for superficial and well-vascularized defects, flaps are preferred for deeper defects, exposed bone or cartilage, and cosmetically sensitive facial areas (2).

Table 1. Main Facial Flap Types, Indications, and Key Advantages in Facial Reconstruction

Flap Type	Common Examples	Typical Indications	Advantages
Local flaps	Rotation, advancement, transposition, bilobed, rhomboid	Small to moderate cutaneous defects within a single subunit	Excellent color and texture match; minimal donor-site morbidity; scars hidden along relaxed skin tension lines
Perforator-based local flaps	Keystone perforator island flap, perforator-based flaps	Small to moderate facial defects with adequate adjacent tissue	Robust vascular supply; minimal donor morbidity; reliable reconstruction
Regional flaps	Cervicofacial flap, forehead flap, supraclavicular flap	Large facial defects or multizonal reconstruction after oncologic surgery	Large tissue coverage; good skin match for midface and nasal reconstruction
Tissue-expanded flaps	Expanded neck or chest flaps	Large benign lesions or deformities requiring additional local tissue	Provides skin with similar color and texture; improved contour restoration
Free flaps / perforator free flaps	Thinned ALT flap, thickness-controlled perforator flap	Extensive or deep defects (>40 cm²), complex facial reconstruction	Large surface coverage; reliable vascularity; adaptable thickness for contour matching
Prefabricated expanded composite flaps	/ Expanded thoracic monoblock flap	Total or near-total facial soft tissue reconstruction	Provides wide tissue coverage with good color match

DISCUSSION

Facial flap reconstruction has evolved significantly over recent decades, allowing surgeons to address increasingly complex defects while maintaining aesthetic and functional outcomes. Local flaps remain the cornerstone of reconstruction for small and moderate defects due to their simplicity and reliability (1).
 However, larger or multizonal defects often require more complex strategies involving regional or combined flaps (7). Perforator and free flaps have further expanded reconstructive options by providing well-vascularized tissue capable of restoring large facial defects with minimal donor-site morbidity (9).
 Despite these advances, proper flap selection remains critical. Surgeons must consider defect size, depth, facial subunit involvement, and aesthetic requirements when choosing the most appropriate reconstructive approach.

CONCLUSION

Facial flaps play a fundamental role in modern reconstructive plastic surgery. From simple local flaps to advanced microvascular techniques, flap-based reconstruction allows restoration of facial defects while preserving both function and aesthetics.
 Advances in perforator flap techniques, tissue expansion, and free flap reconstruction have broadened reconstructive possibilities for complex facial defects. Successful outcomes

depend on careful surgical planning and appropriate selection of reconstructive technique based on defect characteristics.

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