RESEARCH PAPER

Preservation Of Nasal Architecture: Axial Frontonasal Flap Following Wide Excision Of Basal Cell Carcinoma

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ABSTRACT

Introduction: Basal cell carcinoma (BCC) is the most common cutaneous malignancy, frequently affecting sun-exposed areas such as the nasal region. Achieving complete tumor excision while preserving nasal architecture is a major reconstructive challenge.

Case Illustration: We report a 64-year-old female with a hyperpigmented nodular lesion on the nasal dorsum, progressively enlarging over six months. Histopathology and immunohistochemistry confirmed BCC. Surgical management involved frozen section-guided wide local excision, followed by reconstruction using a modified axial frontonasal flap. The flap was elevated in subperiosteal and subperichondral planes, incorporating the nasalis muscle for enhanced perfusion. A V–Y advancement-like modification minimized tension and preserved nasal contour.

Discussion: The axial frontonasal flap, a versatile transposition and rotation flap, provides excellent vascularity, tissue match, and scar concealment. Its design enables incisions along relaxed skin tension lines and aesthetic subunit borders, improving cosmetic outcomes. In this case, strategic modifications supported a tension-free closure with minimal distortion. Despite the central location of the lesion limiting ideal adherence to subunit principles, oncologic safety was prioritized. The reconstruction achieved satisfactory symmetry, flap viability, and minimal scarring.

Conclusion: Frozen section-guided excision combined with a modified axial frontonasal flap offers an effective, single-stage approach for managing central nasal BCC. It ensures oncologic clearance while optimizing aesthetic and functional outcomes, particularly in elderly patients with favorable skin laxity..

Keywords: basal cell carcinoma, nasal preservation, axial frontonasal flap, frozen section, facial symmetry

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INTRODUCTION

Basal cell carcinoma (BCC) is the most common skin cancer in humans, classified as a low-grade malignancy originating from the basal layer of the epidermis. It is characterized by slow growth, local invasiveness, and low metastatic potential.[1,2] Alongside squamous cell carcinoma (SCC) and Merkel cell carcinoma (MCC), BCC belongs to the non-melanoma skin cancer (NMSC) group, which differs from melanoma in behavior and management. NMSC is the most frequently diagnosed malignancy worldwide, with incidence continuing to rise. BCC accounts for approximately 75% of NMSC cases globally and 65.5% in Indonesia, followed by SCC (23%) and melanoma (7.9%).[1,3]

The primary etiological factor is ultraviolet (UV) radiation, especially UV-B (290–320 nm), which induces p53 mutations, DNA damage, and immune dysregulation.2 Clinical manifestation can occur decades after exposure, with changes often beginning in early adulthood. Sun exposure—particularly in fair-skinned individuals and those with prolonged outdoor activity—is the leading environmental risk factor.[1,2] Consequently, BCC commonly affects sun-exposed areas such as the face, neck, and scalp.[4] In equatorial countries like Indonesia, constant UV exposure and outdoor occupations increase the risk.[2] Other contributing factors include ozone depletion, climate change, and lifestyle habits.[2,4,5]

Age is a major risk factor. About 90% of BCC cases occur in individuals over 60, with incidence doubling by age 70. Although 15% occur in those aged 20–40, older adults remain the most affected.[1,6] A retrospective study at Dr. Soetomo General Academic Hospital (2020–2022) found 69% of BCC patients were over 59 years old. Interestingly, 60.6% were female, differing from global trends. Higher

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tumor stages were linked to outdoor activity, reinforcing the role of chronic UV exposure.[6]

Despite advancements in prognosis, recurrence of basal cell carcinoma (BCC) may still occur due to residual cancer cells that are not detected by histopathological examination—the current diagnostic gold standard.[4,5] Surgical excision is the mainstay of BCC treatment, particularly for facial tumors where both oncologic control and cosmetic outcome are critical. The nose, a common site, poses reconstructive challenges due to its central location and complex anatomy. The dorsum nasal requires meticulous reconstruction to preserve facial symmetry and aesthetics. Among available techniques, the axial frontonasal flap is reliable, versatile, and aesthetically favorable.[6]

This case report describes the use of frozen section-guided wide local excision followed by a modified transposition and rotation flap—specifically, an axial frontonasal flap—for a midline nasal BCC. This single-stage procedure is advantageous in elderly patients due to skin laxity, allowing for flap mobility, tension-free closure, and contour restoration. It also enables scar placement along natural facial lines, providing both oncologic safety and favorable cosmetic outcomes.

Case Illustration

A 64-year-old female was referred to the Oncology and Dermatology Surgery Division, Department of Dermatology, Venereology, and Aesthetic, Dr. Soetomo General Academic Hospital, Surabaya, with a 20-year history of a dark-colored lump on her nose. Over the past six months, the lesion had grown rapidly and was frequently manipulated by the patient, resulting in superficial ulceration and intermittent bleeding, particularly when unintentionally scratched. She denied spontaneous bleeding, pruritus, or pain. No similar lesions were noted elsewhere on the body.

From the anamnesis, there was no history of diabetes mellitus, hypertension, or prior malignancy. The patient reported no known drug or food allergies. A family history of breast cancer was present in her younger sister. She had never used sunscreen and reported frequent ambient sun exposure due to routine outdoor activities. No previous treatment had been sought for the lesion.

Dermatological features revealed a solitary 1–1.5 cm hyperpigmented nodule on the dorsum nasal region with a dark brown-to-black crust and surface ulceration (Figure 1). Dermoscopic evaluation revealed hallmark features of pigmented BCC including blue-gray ovoid nests, representing aggregated pigmented tumor nests in the dermis, central ulceration or crust, absence of a pigment network, favoring a non-melanocytic origin.

Punch biopsy performed on January 3, 2025, demonstrated ulcerated epidermis with dermal tumor nests of monomorphic epithelial cells exhibiting peripheral palisading, without stromal clefts—suggestive of BCC. Immunohistochemical staining (January 17, 2025) revealed CD10 positivity in tumor and stromal cells, diffuse BCL2 cytoplasmic staining, nuclear P63 positivity, and negative BerEP4. These findings confirmed the diagnosis of BCC. Chest X-ray (February 10, 2025) showed no evidence of metastatic lesions in the visualized lungs and bones. Cardiomegaly is noted, along with elongation of the aorta and aortic sclerosis.

Figure 1. Pre-operative of BCC: a solitary 1–1.5 cm hyperpigmented nodule on the dorsum nasal region with a dark brown-to-black crust and surface ulceration.

The procedure was performed under a combination of general anesthesia, administered by the anesthesiologist, and local anesthesia using the tumescent technique applied by the dermatologic surgeon. After sterile preparation and draping, a circular excision was made around a darkly pigmented nodular lesion on the nasal dorsum. The incision extended through the epidermis, dermis, and subcutaneous

tissue down to the perichondrium, ensuring adequate depth and margin clearance. The excised specimen, approximately 2 × 1.5 cm in size, was submitted for frozen section histopathological analysis to confirm complete tumor removal (Figure 2).

Following tumor excision, the surrounding nasal tissue was gently undermined to minimize tension during closure. Given the location and dimensions of the resulting defect, a modified rotation and transposition flap—specifically, an axial frontonasal flap—was selected for reconstruction, with the goal of preserving nasal form and symmetry. This flap design enabled closure of the donor site either via V–Y advancement in the glabellar region or horizontal closure along the nasal bridge, depending on tissue mobility and contour harmony.

The flap was meticulously elevated in the subperiosteal plane over the nasal bone and in the subperichondral plane over the upper lateral cartilages. Inclusion of the underlying nasalis muscle ensured a robust vascular supply to support flap viability. The modified design featured an extended arc of rotation to accommodate tissue tethering and optimize alignment with native nasal contours.

Once the flap was rotated and transposed into position over the dorsal nasal defect, layered closure was initiated. A conservative Burow's triangle excision was performed at the pivot point, limited to the dermis and epidermis, sparing the subcutaneous layer to preserve critical vascular structures.

Closure of the deep dermis was achieved using 4-0 polyglactin (Vicryl) in interrupted buried sutures, minimizing dead space and distributing tension evenly. The epidermal layer was approximated with 5-0 polypropylene (Prolene) using interrupted sutures to enhance skin-edge precision and reduce the risk of hypertrophic scarring. Sutures were strategically placed along relaxed skin tension lines (RSTL), particularly within the glabellar and nasal bridge areas, to enhance scar concealment and maintain facial symmetry.

In the immediate postoperative period and the initial days, the patient exhibited marked local inflammation and slight nasal asymmetry, with no tip elevation—findings that gradually subsided over the subsequent weeks. There was no evidence of wound infection, suture dehiscence, prominent scarring, or significant pigmentary changes. A mild dog-ear deformity was initially observed near the medial canthus of the left orbit. However, the deformity was minimal, asymptomatic, and gradually resolved during the healing process without requiring surgical correction (Figure 3).

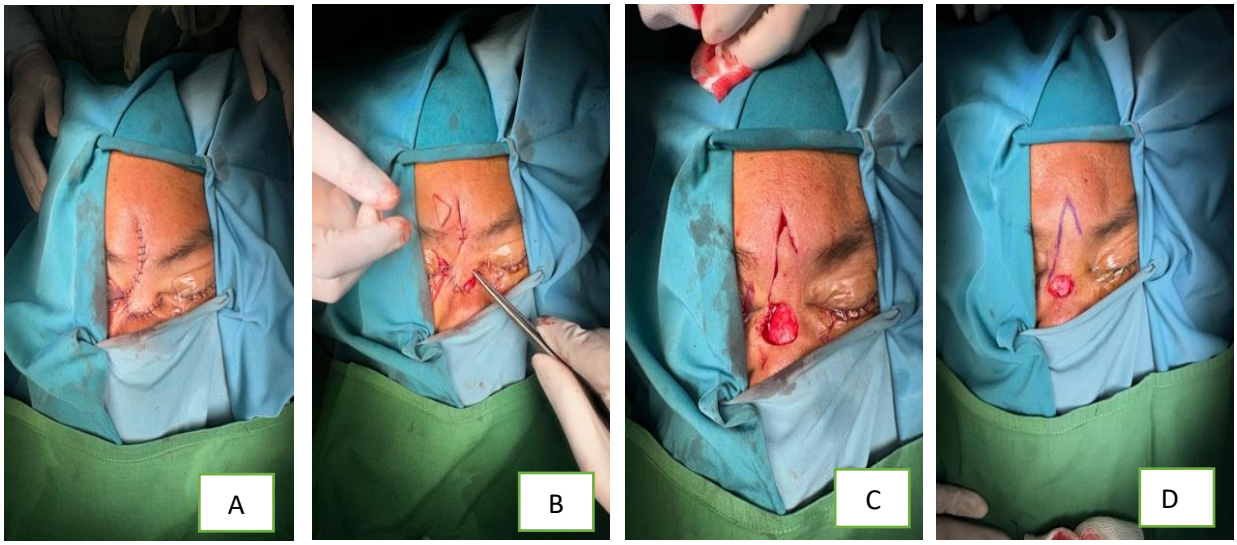
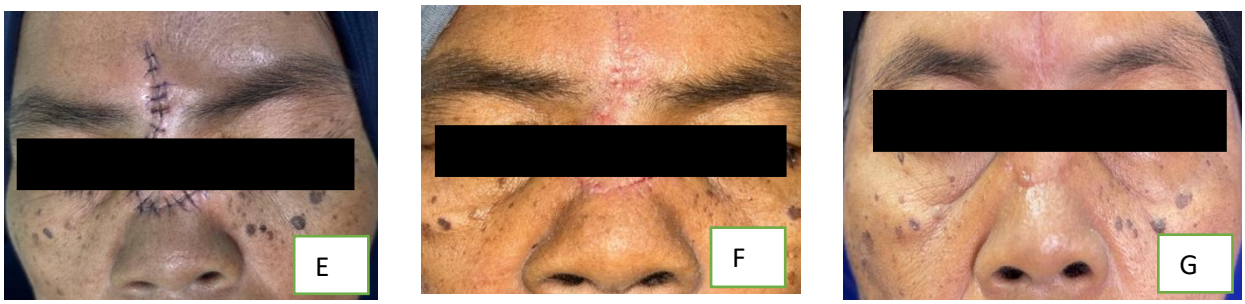


Figure 2. (A) Final defect after wide local excision with clear margins; preoperative markings followed relaxed skin tension lines. (B & C) Modified dorsal rotation flap with glabellar transposition and Burow's triangle excision to optimize closure. (D) Immediate postoperative result after layered closure with 4-0 polyglactin and 5-0 polypropylene simple interrupted sutures.

Figure 3. (E) Postoperative Day 3: Mild inflammation was noted without nasal asymmetry, signs of infection, or wound dehiscence. (F) Postoperative Day 7: Sutures were removed uneventfully, with no observed complications.(G) Postoperative Day 54: Suture line scars were visible, but there was no distortion or dysmorphia of the nasal architecture.



Discussion

In this case, a 64-year-old female presented with a long-standing hyperpigmented lesion on the nasal dorsum, which was subsequently confirmed as BCC through histopathological and immunohistochemical analysis. Management required not only complete oncologic excision but also meticulous reconstructive planning to restore nasal form and preserve aesthetic integrity.

The nasal dorsum is a common site for BCC, and its surgical reconstruction poses particular challenges, influenced by the size and depth of the defect, its precise anatomical location, and the patient's unique nasal contour and skin characteristics.[7] As a central and highly visible facial feature, the nose plays a key role in facial aesthetics. Consequently, nasal reconstruction requires meticulous attention to cosmetic outcomes. The concept of facial aesthetic units has been well established, and it is essential that postoperative scars align with these units to achieve a harmonious appearance.[8] The nose is anatomically divided into distinct topographic subunits, including the dorsum (back), tip (point), alae (wings), sidewalls (flanks), and soft triangles.[9] The subunit principle in nasal reconstruction advocates for placing surgical scars along the natural borders of these subunits. This allows scars to blend with the normal light-reflecting ridges and shadowed valleys of the nose, making them less noticeable. In contrast, scars that traverse smooth surfaces tend to be more visible. However, many local flaps used in nasal reconstruction do not strictly adhere to this principle, potentially compromising aesthetic outcomes.[9,10]

In this case, the lesion was located centrally on the nasal dorsum, making adherence to the subunit principle challenging. A horizontal incision across the dorsum was necessary to ensure complete excision, prioritizing oncologic safety over ideal scar placement. This highlights the importance of individualized planning based on tumor characteristics and anatomical context. An axial frontonasal flap was selected for its reliable vascular supply, good tissue match, and suitability in elderly patients with increased skin laxity. Compared to other local flaps, it provides superior contour restoration, scar concealment, and preservation of nasal architecture—particularly important in central nasal defects where symmetry and profile must be maintained. Marchac and Toth refined the flap design by incorporating a consistent branch of the angular artery, enhancing perfusion reliability.[1,10]

To minimize distortion and optimize results, we used a simple modification resembling a V-Y advancement. By placing the pedicle on one side, the flap could slide caudally with minimal tension, enabling easier mobilization and tension-free closure. This approach preserved nasal structure, supported natural contours, and produced favorable aesthetic and functional outcomes.[8,9,10]

Conclusion

This case illustrates the challenges and considerations involved in managing BCC located on the nasal dorsum, particularly when lesions occupy central positions that complicate adherence to aesthetic subunit principles. Despite the ideal of aligning incisions along topographic unit borders to minimize visible scarring, oncologic safety took precedence in this case. The use of frozen section-guided wide local excision ensured complete tumor clearance, while a modified axial frontonasal flap provided reliable tissue coverage with good perfusion, minimal distortion, and acceptable aesthetic outcomes. The procedure demonstrated the importance of tailoring reconstructive strategies to the individual patient, balancing oncologic goals with cosmetic priorities to achieve optimal results in a single-stage surgery.

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