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Basics in dermatologic surgery: the Limberg flap as treatment option for high-risk basal cell carcinoma with preauricular location

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The case

A 75-year-old male presented to the dermatology department with a primary complaint of a tumorous lesion, measuring 4×3 cm, located in the right preauricular region. Histological examination confirmed the diagnosis of basal cell carcinoma, and surgical excision under local anesthesia was recommended.

Our choice

Given the face's central role in individuality and expression, careful planning of surgical incisions is essential. Defects and their subsequent reconstruction should be designed so that final scars lie parallel to the relaxed skin tension lines and perpendicular to the lines of maximal extensibility. Moreover, reconstruction in the facial region must consider the risk of postoperative scarring and potential functional impairment, necessitating precise surgical planning to ensure both aesthetic and functional preservation.

Primary closure was technically feasible but deemed suboptimal. Attempting to approximate the defect edges under significant tension would have risked compromised vascularity, tissue necrosis, wound dehiscence, and an unfavorable cosmetic outcome, including visible facial distortion due to the lateral pull of the wound edges. A skin graft was similarly excluded because it would result in a noticeable color and texture mismatch. Given our considerations, and despite their position higher on the reconstructive ladder, local flap technique was the more appropriate first-line option.

We present a case involving a medium-sized primary defect following surgical excision of a basal cell carcinoma in the preauricular region. Reconstruction was performed using a classic rhombic (Limberg) transposition flap. Although primary closure and simpler local flap options were technically feasible, the Limberg flap was selected due to its superior potential for optimizing both functional preservation in the region and aesthetic outcome.

Procedure

Prior to excision, the defect was carefully outlined. It was noted that the patient had sufficient cutaneous elasticity, allowing for optimal mobilization of local tissue. To ensure the final closure aligned with the lines of maximal extensibility, the cutaneous defect was planned using a standard geometric rhombic design (Figure 1a).

A 4×3 cm tumor located in the right preauricular region was preoperatively marked and excised with appropriate resection margins under local anesthesia with 1% lidocaine with two drops of adrenaline. The resulting primary defect had a rhomboid configuration (ABCD).

In the classic rhombic (Limberg) transposition flap design, the flap is based on a geometric four-sided defect of equal side length (AB=BC=CD=DA), with two acute angles of 60° and two obtuse angles of 120°. For any rhomboid defect, four potential flap orientations can be designed. In this case, the optimal flap was selected from the adjacent cheek inferior to the short axis on the right side of the defect. The cheek provided favorable skin laxity, and incision placement has allowed alignment with relaxed skin tension lines and lines of maximal extensibility. Additionally, the patient's pronounced periocular rhytids provided a more natural camouflage for the initial incision of the donor site.

The short axis (DB) should be oriented preferably perpendicular to the relaxed skin tension lines. DB was then extended by a length equivalent to one side of the rhombus (DB=AB=CD=DA), creating point E and forming incision BE (BE=DB). From point E, a parallel incision EF was made inferiorly, equal in length to BC. Careful undermining is required to avoid injury to the facial nerve branches, the auriculotemporal nerve, and the superficial temporal artery and vein. The newly created rhomboid (BEFC) was undermined and elevated in the subcutaneous plane (Figure 1b). The flap was then transposed around pivot point F into the primary defect: point E advanced to point A, and point F advanced to point B, allowing primary closure of the donor site along BE.

Initial suturing was performed at point BF to secure the flap into position, followed by fixation at the apex EA. The remaining secondary defect was closed with single interrupted sutures (Figure 1c). The main tension vectors were distributed around points BF and EA. The BE margin was oriented parallel to the



Figure 1. Intraoperative view. **a**) Designing the classical rhombic (Limberg) flap; **b**) the newly created rhomboid (BEFC) is undermined and elevated in the subcutaneous plane; **c**) the remaining secondary defect is closed with single interrupted sutures; **d**) final result.



Figure 2. Postoperative view: 1-month postoperative follow-up.

relaxed skin tension lines beneath the infraorbital region, while the AB and CD margins were placed perpendicular to the lines of maximal extensibility. No postoperative functional impairment was observed (Figures 1d and 2).

Comment

The concept of "Why climb a ladder when you can take the elevator?" has been adopted in reconstructive surgery to emphasize flexibility in technique selection.[1] Originally, the reconstructive ladder – progressing from primary closure to skin grafts, local flaps, and finally distant flaps – has served as a stepwise algorithm for choosing the appropriate reconstructive option. Although the reconstructive ladder remains a useful and safe algorithm for selecting an appropriate reconstructive option, the reconstructive elevator concept allows the surgeon to advance directly to the most suitable level of complexity based on the patient's clinical profile, defect characteristics, and anticipated outcomes.[1]

The classical rhombic (Limberg) flap represents a versatile, reliable, and efficient local flap.[2] Its geometric design allows pre-

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dictable transposition of adjacent tissue with minimal donor site morbidity and well-preserved neurovascular supply.[2] It is particularly valuable for small-to-medium-sized defects in the head and neck region, especially when primary closure is not the most suitable option.[2]

The Dufourmentel flap is a modification of the classic Limberg flap and can also be applied for small-to-medium-sized cutaneous defects.[3] Although some authors suggest that it offers advantages in terms of improved vascular preservation and easier donor-site closure, its more complex geometric design may increase the risk of technical errors during planning and execution.[3] For facial defects, the Limberg flap offers excellent functional and aesthetic outcomes without the need for complex preoperative planning or specialized design considerations, making it an effective and versatile reconstructive option.[2]

The outcome

The outcome at the 1-month postoperative follow-up is shown in Figure 2.

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