Modified H-plasty in large basal cell carcinoma defect reconstruction on the forehead

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Abstract

Basal cell carcinoma (BCC) is the most common malignancy worldwide. Surgical removal is considered the gold standard treatment. However, large defects following excisional surgery can pose a significant challenge for reconstruction, especially in cases where primary closure is not possible. In these cases, skin flaps may be used. Most traditional skin flaps are limited by design to take advantage of only one region of relative skin excess. This paper reports a case of a large forehead defect following BCC excision that was successfully reconstructed by a modified H-plasty involving a U-plasty and rotation-advancement flap. Maintenance of aesthetics without impaired function is the aim of closure defects with combined flaps.

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Introduction

Globally, basal cell carcinoma (BCC) is the most common cutaneous malignancy. Numerous factors, including genetics and the environment, but most notably prolonged chronic ultraviolet exposure, play a role in the pathogenesis of BCC. The elderly are the most commonly affected age group (>65 years), and definitive diagnoses are confirmed through histopathological examination. Although BCC is benign in most cases and rarely metastasizes, its locally destructive nature can lead to significant disfigurement and functional impairment.[1]

Sun-exposed areas such as the face are challenging for reconstruction, as it is a prominent area that serves important aesthetic and functional aspects.[2] Specifically, the forehead area, which makes up one-third of the face, is a challenge as it has relatively high tension and less excess skin available that can be utilized for reconstruction. In addition, various important structures and muscles are also located in the forehead. Therefore, preserving motor and sensory nerve functions is an important outcome that surgeons need to achieve when performing surgeries on defects located on the forehead. Some fundamental aspects that need to be taken into consideration include maintaining eyebrow position, camouflaging incision lines within the relaxed skin tension lines (RSTLs), hair-bearing regions, or between cosmetic subunit junctions.[3]

The simplest method of defect reconstruction is primary closure. However, in cases where this is not viable, the use of other techniques, most notably local tissue flaps, skin grafting, and second-intention healing, can be considered. This is especially important for large defects, where multiple techniques might need to be combined to achieve success. The use of flaps is more favorable compared to skin grafts, as they preserve the integrity of the facial cosmetic units by placing scars at their junctions and restoring the contour with similar adjacent tissue. They also have a relatively higher success rate with lower complication rates.[4] We report a case of a BCC defect on the forehead in a 75-year-old female who underwent surgical excision, and the resulting defect was reconstructed using modified H-plasty. An 8-month follow-up of the patient showed excellent functional and cosmetic outcomes.

Case Report

A 75-year-old female presented with a large hyperpigmented tumor on the right forehead ten years ago. The patient had a history of extensive chronic sun exposure. Previous diseases and family history were unremarkable. A dermatological examination found a hyperpigmented plaque measuring 5×4 cm, along with ulceration and rolled border (Figure 1A). Dermoscopy revealed arborizing vessels, blue-gray globules, maple-leaf-like areas, and ulceration typical of BCC. (Figure 1B). The diagnosis of BCC was then confirmed through histopathology.

Complete removal of the tumor was done using a 5 mm margin excision and tumescent anesthesia, which resulted in a large defect that extended from the right forehead to the right eyebrow (Figure 2A). To reconstruct this, a modified H-plasty was planned. The first part of the reconstruction was making a full-thickness combination of rotation and advancement flaps on the cheek as the donor area. A curvilinear incision from the superolateral side of the defect was made, and it extended along the hairline to the preauricular area down to the inferior side ear lobe. Undermining of tissue was performed at the upper subcutaneous level to allow an upward-advancing movement along with a rotation flap (Figure 2B). In addition, Burrow's triangle excisions were made behind the pinna and inferolateral side of the lower eyelid to allow the tissue to be rotated and advanced, covering the defect, as well as to prevent the dog ear phenomenon. The second part of the reconstruction was made to cover the rest of the defect in the center of

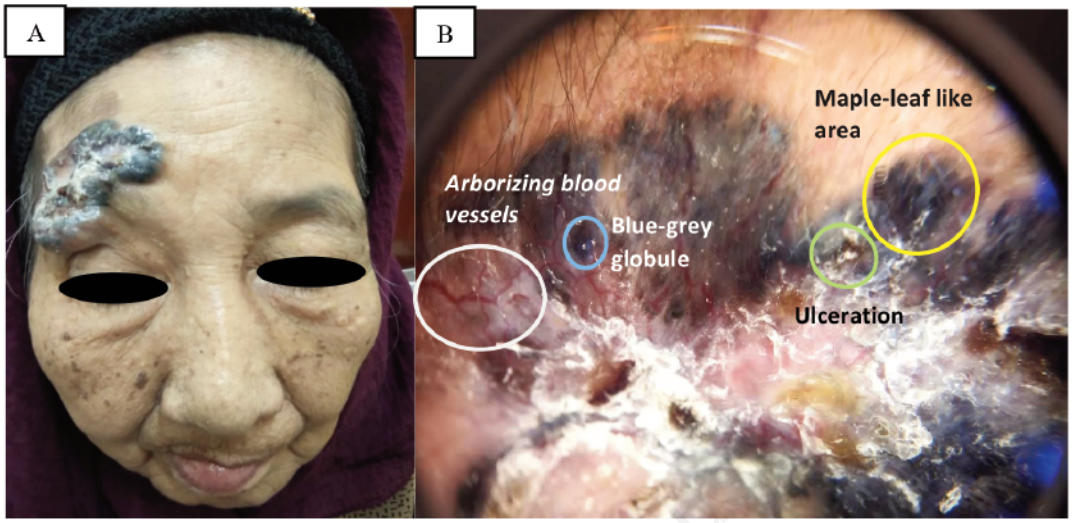

Figure 1. **A**) Initial lesion presenting as hyperpigmented plaque and ulceration along with rolled borders; **B**) dermoscopy findings typical of basal cell carcinom.

Figure 2. **A**) Surgical markings and procedure; **B**) undermining of the subcutaneous fat; **C**) the remaining defect was closed; **D**) postoperative result; **E,F**) after surgery, the contours of the forehead and cheeks were preserved with no color change, an excellent overall result.

the forehead using U-plasty (Figure 2C). The primary flap is kept in place to close the majority of the defect (Figure 2D), which was sutured using 5-0 Vicryl®. The patient was scheduled for weekly wound care for several weeks and recovered with excellent skin contour and no complications within a follow-up period of 8 months. (Figure 2 E,F).

Discussion

Factors that should be considered before choosing the treatment for BCC include the degree of advancement and size of the tumor, the infiltration of the tumor into surrounding adjacent tissue, the location of the tumor, the overall health condition of the patient, and the history of previous treatment. Surgical removal, when possible, is still considered the gold standard treatment for BCC. The aim is the complete removal of the tumor while still preventing functional and cosmetic outcomes.[5] This is supported by a Cochrane review by Thomson *et al.*, published in 2020.[6] In general, surgical excision of lesions located on the head has a 5-year cure rate of 97% for lesions measuring <6 mm and 92% for lesions measuring >6 mm.[1,6] Facial defects may vary in depth as well as affected areas, involving either a single or multiple cosmetic units or bridge units. In facial reconstruction, conceptualizing the defect according to these facial cosmetic units and the design of the flaps is fundamental.[4] Reconstruction of large defects usually requires multi-staged procedures, including intricate and multiple flap designs that should be made along the RSTLs.[3]

In large defects that involve more than a single cosmetic subunit, a combination of multiple flaps is more favored. The combination of flaps will preserve the integrity of the facial cosmetic units by placing scars at their junctions and restoring the contour with similar adjacent tissue. In addition, combined flaps can be performed in a single-stage procedure.[7]

In our case, the forehead defect was managed with a combination of rotational and advancement flaps using the malar and temporal as donor areas, while the remaining defect in the central forehead was closed with U-plasty. Wang *et al*. found that a combination of flaps in managing large defects will result in a higher success rate as it decreases the likelihood of tissue necrosis, wound formation, and tension compared to a single flap.[4,8,9] The advancement flap allows better scar placement on the forehead creases or the upper brow area by using a skin reservoir of the temporal areas. Depending on the individual, either the horizontal or vertical plane can provide the greatest tissue laxity.[3]

The rotation flap works by elevating and rotating healthy tissue adjacent to the defect for coverage by utilizing a pivot point. The advantage of this method is that it does not require as much tissue laxity compared to the advancement flap. In addition, the proper undermining of surrounding tissue is essential to increase tissue mobility.[1,3] The recovery of our patient was excellent, with no wound dehiscence or tissue necrosis, resulting in a favorable cosmetic outcome.[3,4] To achieve a maximum cosmetic outcome, incision lines should be placed between the RSTL and adjacent hairline to allow for scar camouflage. In addition, the excision of Burrow's triangles was made to prevent the dog ear phenomenon.[3,10] However, it should be noted that one of the major complications that may arise from lengthy, deep undermining is the possibility of sensory nerve damage. This transection of sensory nerves may be unavoidable in some cases, especially those that require deep horizontal incisions. Careful undermining in the high to mid subcutis may prevent nerve damage while operating in a superficial plane. The transection of the temporal nerve, as in our case, can result in brow ptosis, facial asymmetry, and sometimes visual impairment. To reduce these risks, a flap should be performed in the mid-subcutaneous plane.[3]

Conclusions

Depending on the size and location of the tumor, several techniques may be needed for facial defect reconstruction. This paper demonstrates the usefulness of modified H-plasty in wide and complex defect reconstruction of the lateral and central subunits of the forehead, which can result in excellent functional and aesthetic outcomes.

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