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Reconstruction of a High-Tension Post-Mohs Defect with Bilateral Rhombic Transposition Flaps and Double Z-Plasties: A Case Report

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Abstract

Large defects on the upper back may be difficult to reconstruct effectively due to the highly tensile and inelastic qualities of local skin. Moreover, some patients tend to have kyphotic curvature of the spine, which can exacerbate the tensile forces on a primary closure. We present a post-Mohs surgical case of a mid-central back defect managed using bilateral rhomboid transposition flaps, each with double Z-plasties. This approach allowed for complete redirection of tension vectors and provided the necessary tissue laxity for optimal wound closure. The incorporation of Z-plasties facilitated skin lengthening during flap rotation, enhancing the overall reconstruction. Postoperatively, the patient achieved complete wound healing without complications. This technique demonstrates the positive effect of combination transposition flaps in addressing complex defects in areas with limited tissue availability.

Keywords: Mohs micrographic surgery, infiltrative basal cell carcinoma, plastic surgery, rhombic flap, Z-plasty, reconstructive surgery

1. Introduction

Mohs micrographic surgery is the gold standard for treating non-melanoma skin cancers, especially highly aggressive large tumors. Though basal cell carcinoma has a low metastatic rate of less than 1 percent, it can grow to become significantly disfiguring and locally aggressive.[1]

With sequential frozen tissue processing and microscopic examinations, Mohs technique has been found to be the most useful surgical treatment in treating basal cells tumors, reaching a 99% cure rate for small, primary lesions. However, this cure rate is significantly reduced for recurrent, locally aggressive, or large tumors in these cases. Micrographic surgery can help treat these tumors when they extend beyond recommended standard excisional margins.[2]

Here, we present a compelling reconstruction case following successful removal of a locally aggressive, large basal cell carcinoma tumor that extended beyond standard recommended margins. We utilize a unique reconstructive approach involving bilateral rhomboid transposition flaps with double Z-plasties to successfully repair a post-operative defect resulting from a nodulo-infiltrative basal cell carcinoma.

2. Case Presentation

A 73-year-old female presented with a primary nodulo-infiltrative basal cell carcinoma appearing as a 2.7 cm x 1.4 cm eroded plaque located on her mid-central back. The lesion was removed by micrographic surgery in two stages with a resultant defect measuring 8.1 x 6.3 cm, involving fascial planes and subcutaneous fat (Figure 1). Two rhombic transposition flaps were designed with the first and second Z-plasties at 120 degrees and 90 degrees respectively (Figure 2A-B).

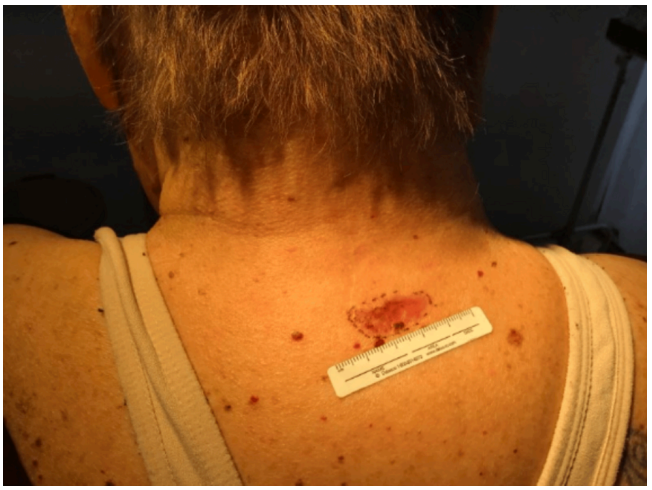

Figure 1. Pre-operative lesion.

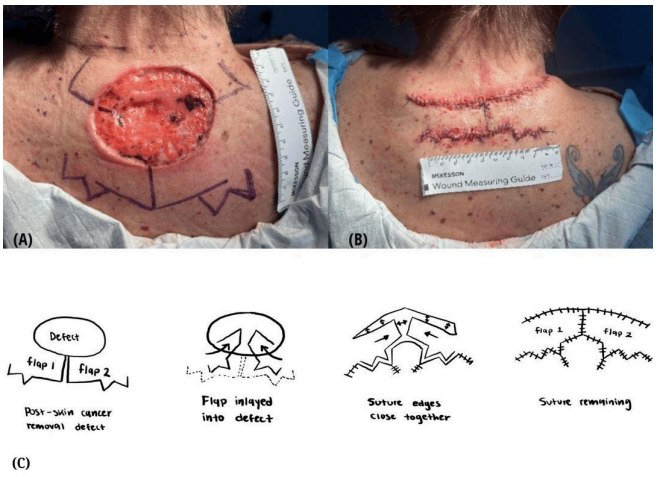

Figure 2. (A): Postoperative defect measuring 8.1 cm x 6.3 cm. Surgical markings drawn to extend to surrounding skin. **(B):** Surgical repair of the defect. **(C):** Illustration of Flap Repair. (1) Both flaps are designed with a 90° take-off angle at the midpoint of the long axis of the primary defect, with a width equivalent to 110% the width of the short axis of the defect. The rhombic secondary angle is the typical 60°, followed by 120° from the first Z-plasty, which is 90° from the second Z-plasty. (2) Both flaps are incised to the level of the subcutaneous fat and inlayed into the primary defect carefully. (3) Lower tension wound edges are approximated to help reduce the overall stress on the flap, while enhancing the intraoperative tissue creep and expansion. (4) Additional approximation of any remaining gaps between the wound edges and the flap edges are performed leading to a characteristic angulated repair shape and excellent camouflage of the scar

The defect was repaired with the rhomboid transposition flap, where the first Z-plasty helped advance the flap, occupying the original space of the flap followed by the second Z-plasty enhancing and occupying the original position of the first Z-plasty (Figure 2C).[3]
After the flaps were transposed into the defect, the subcutaneous tissue and dermis were secured with 3-0 polyglactin and 4-0 polyglactin sutures. Then, a simple interrupted epidermal suture was performed with 3-0 polypropylene and 4-0 polypropylene.

A pressure dressing was applied consisting of ointment followed by nonstick gauze and paper tape. The patient was instructed to change dressing daily until followed up for suture removal in two weeks. The patient did not experience any discomfort during the healing process, nor after the removal of the sutures.

The patient presented a clinical 6 months later for a preventative skin cancer screening. The following images were taken, and the patient had no evidence of carcinomatous recurrence (Figure 3).

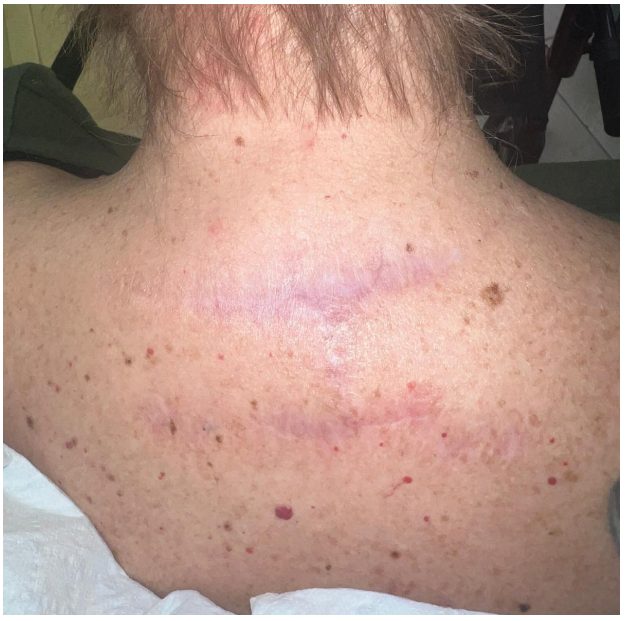

Figure 3. 6-month postoperative view after wound reconstruction with a rhomboid transposition flap with double Z-plasties

3. Discussion

The presented defect is located within the upper central back cosmetic subunit and presents a unique challenge due to the natural inelasticity of local skin, combined with the added tension of a patient's postural inclination. Moreover, the patient might be unable to tend to a long-term wound due to her social situation. Careful consideration of primary and secondary vectors when approaching certain wounds is also crucial in avoiding immediate and postoperative complications.

Reconstructive alternatives were evaluated. Granulation or healing secondary intention was initially the first option. However, given the location of the wound, it would be challenging for the patient to clean and keep the wound disinfected for several months, making this option not ideal.[4] Given the location and these factors, a side-to-side closure would be at high risk of dehiscence, rendering flaps and grafts as more viable strategies for reconstruction.

A full-thickness skin graft was considered; however, the size of the defect created a challenge for graft uptake and would result in a larger secondary defect. Wound care

involving two separate sites poses a challenge for the patient, who lived alone. A split-thickness skin graft was another alternative but generally results in poor cosmesis.

Keystone flap is a trapezoid shaped perforator island flap that advances to cover defects by supplying blood through perforating arteries or small vessels; it was an alternative but too much tension at the leading edge of the flap would increase risk of wound dehiscence.[5] A primary closure was also considered, but due to the size of the wound, it was not possible in a location where there was a lot of tension and movement. It can further pose a risk of the suture breaking due to significant tension.[4]

Combining flaps with Z-plasty is an effective tool for reconstructive surgery. Several reports exist demonstrating the effective use of the flaps for recruiting viable local tissues into challenging surgical defects. Two studies showed effective closure of deep forearm wound with exposed periosteum and tendons with a rhombic double Z-plasty.[6,7] Another demonstrated closure of a large forehead multi subunit wound with a single lobe with transposition combined with Z-plasty.[8]

This is the first report demonstrating the value of this reconstructive approach for a large wound with high tension which may benefit patients who need single-stage, immediate postoperative closure without the unpredictability and second surgical wound site associated with skin grafts.

4. Conclusion

It is important to evaluate and assess alternatives for reconstructive surgery to perform a well-cosmetic outcome. The rhomboid transposition flap can provide the needs for the neck reconstruction by having enough surrounding skin necessitated for the closure. The addition of the Z-plasties at the base of the flap at specific angles allows for reorientation into the defect. This technique allows for less tension and more flexibility in the movement of the flap.

Artificial Intelligence Disclosure

Authors of this paper ensure that the manuscript complies with the Journal's strict prohibition on generative artificial intelligence in both text and clinical imagery.

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