



Excellent Closure of Postauricular Defect Using Type-1 Keystone Perforator Island Flap: An Alternative Facial Reconstruction Technique

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Abstract

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BACKGROUND: The use of local flaps is a common and effective method for reconstructing various post-surgical defects. Some advantages of local flaps compared to other methods such as skin grafts are the relatively high success rate and lower complication rates such as infections and wound dehiscence. There are various methods of flaps available and choosing the proper method is based on various factors such as the size of the defect, anatomical location of the defect, and operator capabilities. Therefore, an effective but simple local flap method with a high success rate is needed especially when dealing with defects located on prominent cosmetic areas such as the face.

CASE PRESENTATION: We report the successful use of the keystone perforator island flap for closure of a facial defect caused by basal cell carcinoma removal in a 76-year-old female patient.

CONCLUSION: Although not commonly used for facial reconstruction, this paper reports successful use of this relatively simple and effective method prompting the potential for increased usage in treating small-moderate sized defects on the face.

Introduction

Basal cell carcinoma (BCC) is the most common malignancy in mankind. Data from the United States of America (USA) reported that there are approximately 3.000.000 new BCC cases annually. Furthermore, BCC accounts for up to 75% of non-melanoma skin malignancies (NMSCs) and 25% of all malignancies diagnosed in the USA. The main risk factor for BCC is chronic ultraviolet (UV) radiation, more specifically the UVB spectrum that can trigger mutations in certain tumor suppression genes as well as DNA damage [1], [2]. Although the disease is indolent and often times not life threatening, it can cause significant morbidity and impact patient's quality of life. The management of BCC is determined based on the anatomic location, with surgical approach the gold standard of management [1], [3].

BCC cases located on the facial areas can pose a challenge for physicians to treat as it is a prominent cosmetic area. Surgical technique such as Moh's micrographic surgery (MMS) is an ideal surgical

management technique in ensuring total tumor removal and reduce the number of recurrences. However, the resulting surgical defects can cause both functional and cosmetic challenges that often cannot be reconstructed using primary closure. In such cases, several methods are available for management such as local flaps, free flaps, and skin grafts [1], [2], [4].

We report a case of a 76-year-old female patient with BCC on the right postauricular that undergone surgical excision and initially declined further surgical reconstruction for the resulting defect. After 1-month of secondary healing, the facial defect was then reconstructed using Type-1 keystone design perforator island flap with great results both in cosmetic and functional outcomes.

Case Report

A 76-year-old female patient presented with an asymptomatic solitary black lump on the

right postauricular that gradually enlarged over the past 10 years. The lesion initially started as a small mole that gradually enlarged and occasionally bled. Physical examination found vital signs within normal limits with unremarkable medical history. However, the patient said that she is a farmer with long hours of sun exposure during work and no regular use of sunscreens. Dermatological examination on the right postauricular area found a solitary hyperpigmented ulcerative nodule with irregular but firm borders measuring approximately 2 cm in diameter (Figure 1a). Dermoscopy examination found arborizing vessels, large blue-gray ovoid nests and multiple blue-gray globules typical of BCC (Figure 1b). A wide excision with a 5-mm margin was performed to remove the tumor. Histopathological results confirmed the diagnosis of BCC with all borders free of tumor cells. The resulting defect post-excision measured approximately 3 cm in diameter (Figure 2a). The patient initially declined any surgical reconstruction methods due to personal reasons. However, 1 month after surgery, the patient had a change of mind and agreed for a second surgical procedure for reconstruction. On examination, we found the facial defect partially closed measuring approximately 2 cm × 0.7 cm (Figure 2b).

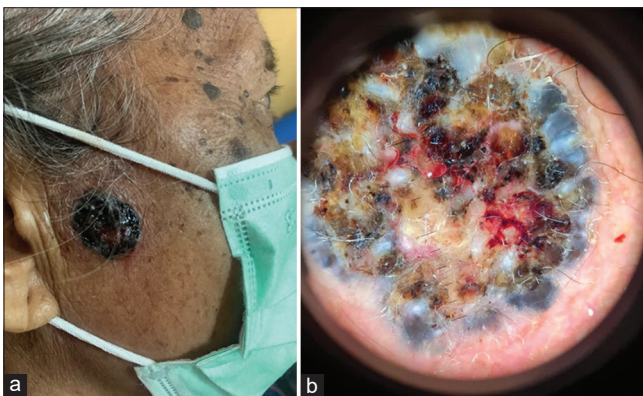


Figure 1: Hyperpigmented ulcerative with irregular and well-defined borders on the right temporal (a); dermoscopic findings (b)

To perform reconstruction of this defect, we decided to use the Type-1 keystone design perforator island flap. After the design of the flap was made, with the width of the flap twice larger than the width of the existing defect (Figure 2b), tumescent anesthesia was performed followed with an elliptical incision and undermining of surrounding tissue from the tip of the defect forming a 90° angle on both sides (Figure 2c). The flap was then advanced anteriorly to cover the defect (Figure 2d). Sutures in the procedure used a 6-0 absorbable thread. Proper wound care and oral antibiotics were administered post-procedure.

A 10-day-follow-up on the patient showed excellent post-surgical results with no signs of infection and dehiscence. The patient was then scheduled for routine weekly follow-up and after 1 month, the sutures were able to be removed (Figure 2d and e).

Discussion

Post-surgical defects can cause significant cosmetic impact that often cannot be reconstructed solely using primary closure mainly due to the extensive size of the defect, the resulting tension physicians will face when performing primary closure, and cosmetic outcome post-procedure. Therefore, the use of methods such as local flaps and skin grafts can be utilized to combat this problem. Local flaps are superior compared to skin grafts as they provide higher success rate. In addition, local flaps will result in similar color and texture between reconstructed and surrounding areas, which is esthetically preferred. Local flaps can be classified into advancement flaps, rotation flaps, transposition flaps, and interpolation flaps. Method of flap selection is made based on skin's elasticity as well as the aesthetic and functional outcomes [5], [6].

In our case, we opted to use the keystone design perforator island flap for reconstruction of the facial defect. The technique, which was first introduced by Behan in 2003, is an excellent method for reconstructing elliptical defects. In essence, the keystone advancement flap is a local type A fasciocutaneous flap comprised of two V-Y advancement flaps [7]. There are five types of keystone advancement flap with various modifications. In our case, as the defect size was relatively small (<2 cm), a Type 1 keystone flap was suitable. In this type, the lateral deep fascia was preserved as to other types where deep fascia are divided to facilitate tissue mobilization [7].

Incision was performed only at skin level followed with blunt dissection to surrounding tissue. Incision lines were in line with the facial relaxed skin tension lines (RSTL) to achieve maximum functional and cosmetic outcomes. The width of the flap was larger compared to the defect with the aim of facilitating movement. In addition, the longer vertical axis was adjacent to the RSTL to improve cosmetic appearance in the healing process [8], [9], [10].

The keystone advancement flap also provides superior vascularization as it has two sources of blood supply from the subcutaneous vascular plexus and perforating vessels of both fascial and mucosal layers [7]. In addition, the method is not as operator-dependent with other more intricate flap techniques such as pedicled muscle flap or free flaps. Although this method is not perfect, with some cases reporting complications such as partial or total flap loss, infections, contour deformity, wound dehiscence, and hematoma, the incidence is relatively infrequent [11].

To the best of our knowledge, literatures reporting the use of keystone advancement flaps in reconstructing facial defects are still limited, with current available publication mostly report the use of this technique in large defect reconstructions located



Figure 2: Resulting defect post excision (a); surgical lines (b); initial incision (c); sutures and 1-month follow-up (d and e)

on the extremities such as the glomerothumeral, genu, elbow, and ankle as reported by a case series by Jovic *et al.* The paper reported the use of the keystone advancement flap on both BCC and melanoma scars in which all cases resulted with excellent results. Furthermore, truncal defects were also reported to be successfully treated using this technique. A 1-month follow-up on the patient showed excellent wound healing, with no signs of infection and wound dehiscence. Sutures were then able to be removed and a monthly follow-up was planned for the patient to ensure the viability of the flap.

Conclusion

The keystone design perforator island flap is potentially a simple, safe, and effective method for elliptical facial defect reconstruction.

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