The kite flap for the reconstruction of Face Skin Defects: a retrospective study

Original Article

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ABSTRACT

Aims: The purpose of this study was to present our experience with a kite flap in reconstruction of facial defect after malignant tumor excision.

Materials and Methods: In this study, a total of 19 patients with facial malignant tumor were treated in the Department of Oral and Maxillofacial surgery of the University Hospital Center Hassan II with kite flaps after complete excision. The survival rate, color, cicatrix of the flap as well as the matching degree with surrounding tissues and patient satisfaction were evaluated after surgery.

Results: Throughout the follow-up period, the flaps remained viable with color and texture closely resembling that of the surrounding skin. There were no reported instances of dysfunction, complications, or recurrence.

Conclusion: The kite flap is a technique used for reconstruction of small to medium-sized defects in various zones of the face. It is a simple surgical method with sufficient blood supply and extensive adaptability.

Key Words: Facial reconstruction, Skin defects, kite flap.

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INTRODUCTION:

Skin defects represent the most common reasons for undergoing reconstructive surgery. While skin defects can occur all over the body, repairing skin defects on the face is more challenging due to the heightened sensitivity to aesthetic considerations [1]. Aside from the aesthetic aspect, repairing these defects might also involve functional impairments, such as difficulties with eyelid closure, lip function, and nasal airway obstruction. [2, 3]. Various factors, such as tumor resection and facial trauma, can result in these defects.

There are various reconstructive methods after excision of skin tumors in this region of face such as primary repair, skin grafts, local flaps, regional flaps, distant and free flaps.

For moderate defects, the prevailing methods of reconstruction often involve locoregional flaps. These flaps consist of tissue from a donor site with a pedunculated axial blood supply, which may not necessarily be located near the defect [4]. This technique has good aesthetic results and texture coordination. Local flaps, including V-Y advancement flaps, are standard methods [5, 6].

The kite flap is a variation of the V-Y advancement flap that accomplishes a greater degree of advancement. It was first reported by Ducours in 1989 as an island flap attached underneath the skin; after the reconstruction, the leftover shape resembles a triangular kite with a tail behind, and therefore the name a 'kite flap'. [7].

In this article, we describe our experiences using kite flaps for reconstructing small to moderate-sized facial defects (< 5 cm) after tumor excision; we provide a focus on this technique with its description and indications.

MATERIALS AND METHODS:

This retrospective study included 19 patients who presented to the Department of Oral and Maxillofacial surgery of the University Hospital Center Hassan II for reconstruction of face skin defects by kite flap after excision of Nonmelanoma skin cancer (NMSC), between January 2022 and January 2023.

The diagnosis of NMSC was determined through clinical evaluation, and written consent forms were signed by all parties involved before surgical excision.

In all enrolled patients, surgical excision of the tumor was achieved; the safe margins were 4-5mm for basal cell carcinoma (BCC) and 6-10mm for squamous cell carcinoma (SCC) prior to receiving the frozen section

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report. All procedures were performed under local anesthesia and completed through reconstruction of the defects by kite flap.The flap's length was twice the base's diameter. We used absorbable suture to repair subcutaneous tissues in order to minimize skin tension. By identifying perforating arteries from subcutaneous artery networks in the central portion of the flap, the blood supply to these flaps was preserved. The flap design was often aligned with the tension lines of the resting skin.

RESULTS:

A total of 19 patients (10 males and 9 females) with diagnosis of NMSC (7 SCCs and 12 BSCs) were enrolled in the study after treatment by conventional tumor excision followed by surgical reconstruction by kite flap. Sizes of wounds varied from 0.5 to 5 cm including both the skin and subcutaneous tissue and in certain cases, partial mimetic muscles were involved. 9 defects were located in the upper lip, 5 in the nose wing and 5 in the cheek .In all cases; Reconstruction was performed with kite flap (Table 1).

Permanent sutures were removed between 5 to 7 days after the surgery, and then patients underwent monthly follow-ups. No complications, such as hematoma, infection, visible dog-ear, pin-cushioning, ischemia, or flap necrosis, were encountered. The kite flaps had the same color and thickness as the adjacent skin and the scars were well concealed.

During the follow-up, there was no sign of a malignant skin tumor recurrence, and all patients achieved favorable aesthetic results in the reconstructed region.

Table 1: Patient characteristics

site	sex	age	cause	Defect size
Upper lip	M: 5 ; F: 4	52–70	SCC: 3 ; BCC: 6	2–5
Nose wing	M: 2 ; F: 3	54–67	SCC: 1; BCC: 4	0.5–4
cheek	M: 3 ; F: 2	58–83	SCC: 3; BCC: 2	1.5–5

Figure 1 ; case 1 : an 65-year-old patient with basal cell carcinoma on the upper lip

a. Design of the flap b. The flap immediately after operation c. the flap after suture removal
d. The flap at a follow-up time of three months
Figure 2 ; case 2 : an 72-year-old patient with squamous cell carcinoma on the upper lip

a. Design of the flap b. The flap immediately after operation c. The flap at a follow-up time of four months
Figure 3 ; case 3 : an 54-year-old patient with squamous cell carcinoma on the nose wing area

a. The defect after tumor excision b. The flap five days after operation c. The flap at a follow-up time of three months
Figure 4 ; case 4: an 61-year-old patient with basal cell carcinoma on the cheek area

a. Design of the flap b. Dissection of the flap c. The flap immediately after operation
d. the flap after suture removal

DISCUSSION:

Basal cell carcinoma (BCC) and squamous cell carcinoma (SCC), belonging to the non-melanoma skin cancers (NMSC), represent the most common types of skin cancer [8]. In this study, patient wounds following BCC and SCC excision were covered with a kite flap, with positive outcomes.

Surgical reconstruction of facial defect after malignant tumor excision continues to pose challenges in facial plastic and reconstructive surgery. There are several reconstructive options in the region of the face, such as primary closure, skin grafts, local flaps, distant and free flaps [6]. Several factors influence the selection of the reconstructive procedure, including the size of the defect, its location, etc.

The perfect facial reconstruction should offer a harmonious blend of color and texture with the surrounding tissues with minimal donor-site morbidity and well-hidden scar. It is preferable to prioritize local tissue reconstruction to achieve optimal cosmetic results [9]. Advancement flaps rely on the surrounding tissue moving along a linear axis to close a defect; the simplest form of advancement flap design involves advancing two skin edges from a fusiform skin excision. Advancement flaps are typically characterized by a length-to-width ratio of either 1:1 or 2:1. [10]. The kite flap is a variation of the V-Y advancement flap that accomplishes a greater degree of advancement. The kite flap is suitable for reconstructing facial defects ranging in diameter from 1 to 5 cm [11]. Especially those of the middle and lower facial regions. Its colour and texture match are excellent. For optimal functional and aesthetic results, the kite flap should be designed parallel to the relaxed skin tension lines.

Based on geometric analysis, when compared to a pivot flap that includes a rotational flap and transposition flap, The Kite flap offers reduced tension, which lowers the possibility of hypertrophic changes and scar widening over time. Additionally, it rarely forms a dog-ear, contributing to the potential for achieving good cosmetic results [10].

Design and features of the kite flap:

• The kite flap is a type of V-Y advancement flap. The subcutaneous pedicle contains arteries and veins of unknown origin, which are nourished by the vascular network within the facial subcutaneous tissue. The facial blood supply is abundant, ensuring the reliability of the pedicle's blood circulation.

• The flap's design should be tailored based on the dimensions of the defect and the mobility of adjacent tissues. When the surrounding area is relatively tight, the flap can be made larger than the defect. Alternatively, if the surrounding tissue is sufficiently lax, the flap can be designed smaller, provided that the wound can still be closed without noticeable tension.

• The flap's depth typically extends to the fat layer, guaranteeing not only an adequate blood supply but also adequate ductility and reduced damage.

• As much as possible, the flap's advancing direction should be parallel to gravity.

Conclusion:

We discovered that utilizing the kite flap is an efficient approach for reconstructing small to medium-sized defects after tumor excision. Taking into account aesthetic evaluation criteria such as symmetry, the number of suture lines, scar width, and its impact on facial expression, the kite flap, characterized by reduced scarring and tension, presents advantages over other local flap techniques.

Conflict of Interest:

There are no conflicts of interest.

Funding:

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Ethical approval:

The authors declare that ethical approval was not required.

Informed Consent:

Patient's consent was taken before presenting the case report and intraoral pictures.

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