

Local rotation flap for reconstruction of a facial defect following squamous cell carcinoma resection. A case report

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Case Report

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Background: Squamous cell carcinoma (SCC) is the second most common cutaneous carcinoma after basal cell carcinoma and accounts for the majority of metastases associated with non-melanoma skin cancer. Cumulative sun exposure, particularly during childhood and youth, represents its most important risk factor. Tumor progression, recurrence, metastasis, and therapeutic resistance are associated with the heterogeneity of malignant cells. The prognosis depends on tumor size, infiltration, location, metastatic spread, and, to some extent, tumor differentiation. Histopathology and surgical excision remain the reference standards for the diagnosis and treatment of SCC. Conventional excision requires complete tumor removal, including a margin of clinically normal-appearing skin and surrounding erythema. Large defects resulting from extensive tumor resection may generate significant tension at the wound edges and increase the risk of necrosis, making tension-release techniques necessary for adequate wound closure.

Local advancement, rotation, and transposition flaps are among the techniques available for reconstruction. Rotation flaps mobilize adjacent tissue along an arc around a pivot point and can facilitate closure of large defects with lower morbidity than muscular flaps. Their design requires an appropriate length-to-width ratio and knowledge of the vascular anatomy of the donor area. Fundamental principles include defect triangulation, preservation of vascular supply, tension distribution along the arc of rotation, and appropriate positioning of the pivot point.

The present article describes the case of a patient with non-melanoma skin cancer (SCC) treated with tumor resection and reconstruction using a local rotation flap.

KEYWORDS: Squamous cell carcinoma, local flap.

Cancer is characterized by the uncontrolled growth of transformed cells (1). It is assumed that everything begins with a single cell that undergoes transformation and repeatedly divides, or duplicates, to form two or more cells, and so on consecutively (1).

Cancer stem cells, or neoplastic stem cells, have the capacity for self-renewal and differentiation into heterogeneous tumor cell lineages, while retaining phenotypic characteristics of stem cells. This manifests the aggressive behavioral characteristics of the neoplasm, such as loss of cellular adhesion and local invasion (2).

Evidence regarding the growth rate of non-melanoma skin tumors is very limited. However, Cañueto et al. (5) calculated the growth rate as the ratio between tumor diameter in millimeters and progression over time, concluding that a rate of 4 mm per month was the cutoff point for determining a rapidly growing squamous cell carcinoma (5).

Squamous cell carcinoma is the second most common cutaneous carcinoma, after basal cell carcinoma (3). Among the risk factors for its development, the most important is cumulative sun exposure, particularly during childhood and youth (3). The 5-year survival rate remains approximately 40–60%. The progression, recurrence, metastasis, and resistance to therapy of this cancer have been

explained by their association with malignant cells, which exhibit extensive heterogeneity (2).

Squamous cell carcinoma accounts for the majority of metastases associated with non-melanoma skin cancer; therefore, early recognition and treatment are important for preventing neoplastic progression (3).

The prognosis (2) of patients with this condition depends on the size, infiltration, and location of the lesion, the presence or absence of metastatic spread, and, to some extent, the degree of tumor differentiation (4).

Currently, histopathology and surgical excision remain the reference standard for the diagnosis and treatment of squamous cell carcinoma (3). Surgical excision remains the reference standard and includes conventional surgery and Mohs surgery. Conventional excision must ensure complete removal and therefore include a margin of clinically normal-appearing skin around the tumor and surrounding erythema. However, this implies that, during surgical treatment, situations commonly arise in which the resected area presents with wide skin margins secondary to tumor size, resulting in a high risk of tissue tension. Therefore, tension-release techniques are necessary to achieve adequate approximation of the skin edges.



Figure 1. This image shows the tumorous lesión caused by squamous cell carcinoma, along with the surgical planning for its resection and reconstruction using a rotation flap.

These clinical situations occur in two different contexts. The first refers to clinical presentations of locally advanced cancer requiring extensive excisions, in which closure of the surgical defect is complicated by high tension at the surgical edges and a high risk of necrosis. The second scenario involves ischemic complications that result in loss of skin coverage and make wound closure more difficult (7).

Among the techniques that can be used are local advancement, rotation, and transposition flaps, which are classified as random-pattern flaps because



Figure 2. This image shows the resected área with 1 cm circumferential margins



Figure 3. Following resection of the tumor, the neck is explored to locate the carotid triangle; three lymph nodes measuring approximately 1 cm are indentified in this área and resected. Additionally, appropriate tissue dissection is performed to créate a rotation flep for closure of the surgical wound.

their vascular supply depends on musculocutaneous perforators located within the flap pedicle, which perfuse the dermal and subdermal microvascular plexuses. In contrast, axial-pattern flaps receive their



Figure 4. This image shows the rotation of the skin flap used to closet he surgical wound, with proper apposition of the wound edges and no tensión

blood supply from a specific cutaneous artery incorporated into the flap itself. Rotation flaps mobilize adjacent tissue along an arc of rotation around a pivot point, whereas transposition flaps transfer tissue across an intervening segment of intact skin (6).

Rotation flaps are a group of surgical procedures that facilitate the closure of large defects with lower morbidity compared with muscular flaps, whether pedicled or free. Their planning requires an appropriate length-to-width ratio and knowledge of the vascular anatomy of the donor area (7).

The fundamental principles of rotation flap design include triangulation of the defect, rotation of the flap along a semicircular arc, preservation of the vascular supply through an axial- or random-pattern pedicle, distribution of tension along the arc of rotation, creation of a pivot point in the area of greatest tension, and incorporation of an additional arc of rotation to facilitate complete coverage of the defect (6).

The present article aims to present the case of a patient with non-melanoma skin cancer (squamous cell carcinoma) who underwent tumor resection and reconstruction with a local rotation flap.

Case report

This is a 77-year-old female patient with a diagnosis of adenoid and nodular variant squamous cell carcinoma in the central facial region (left cheek). Type 2 diabetes mellitus for 1 year, without adherence to medical treatment; systemic arterial hypertension for 10 years, under medical treatment with losartan. No known allergies. Previous surgical history included right hip osteosynthesis. The patient denied smoking and alcohol consumption.

The patient reported the onset of a skin lesion in the left cheek region 2 years prior to evaluation. Initially, the lesion was small, measuring approximately 1 cm in diameter. However, she reported progressive growth over time, reaching an approximate size of 8×6 cm, which prompted her to seek medical evaluation.

A biopsy was performed for histopathological examination, which reported the following result: moderately differentiated, ulcerated squamous cell carcinoma, grade G2.

Based on the histopathological findings, surgical intervention was planned for three-dimensional tumor resection and reconstruction with a rotation flap.

The surgical procedure was divided into two stages. In the first stage, resection of the tumor lesion was performed. The patient was placed under general and local anesthesia, surgical site antisepsis was

performed, and sterile drapes were placed. The incision was outlined and the rotation flap was planned toward the cervical region. A circumferential incision was made around the lesion, preserving 1-cm margins around it. Dissection was performed using electrocautery until the subcutaneous cellular tissue was reached (Figure 2). The muscular tissue was exposed, and invasion of the mandibular branch of the facial nerve was observed; therefore, resection of this branch was necessary. The surgical specimen was removed. Neck exploration toward the carotid triangle was then performed, exposing its structures and identifying three lymph nodes at this level, which were dissected for histopathological examination (Figure 3). In the second stage, the rotation flap was fashioned to achieve adequate approximation of the surgical wound edges. Flap dissection was initiated toward the anterior cervical region in a semicircular fashion. Adequate tissue advancement was confirmed, and the skin edges were approximated, confirming the absence of tension at the wound margins (Figure 4).

The following findings were observed during the procedure: a tumor lesion in the central facial region (left cheek), approximately 8×6 cm in size (Figure 1), extending in depth to the subcutaneous cellular tissue without invading the muscular tissue (Figure 2). Lymph nodes measuring approximately 1×1 cm were identified at the level of the carotid triangle (three lymph nodes), which were resected for histopathological analysis (Figure 3).

During the immediate postoperative recovery period, no adverse events or complications were observed.

At 24 hours after surgery, the patient was evaluated and reported no pain at the surgical site. However, decreased mobility of the cheek region was observed, with mild deviation of the left oral commissure. No difficulty with mastication or swallowing of solid foods was reported.

The patient was discharged and reevaluated 7 days after the surgical procedure. Adequate flap healing was observed, the sutures were removed, and a follow-up appointment was scheduled for 2 weeks later. At that time, adequate postoperative evolution was observed, as shown in Figure 5.

Discussion

Squamous cell carcinoma (SCC) is the second most common cutaneous carcinoma and represents the majority of metastases associated with non-melanoma skin cancer. Its prognosis is related to factors such as tumor size, depth of infiltration, anatomical location, metastatic extension, and degree of tumor differentiation. In the present case, the patient was a 77-year-old woman with a moderately differentiated,



Figure 5. Three weeks after the surgical procedure, adequate healing of the rotation flap is observed. A slight deviation of the left corner of the mouth is noted, secondary to the resection of the mandibular branch of the facial nerve, which had been invaded by the tumor.

ulcerated SCC, classified as G2, located in the left cheek.

An important characteristic of this case was the prolonged evolution and progressive growth of the lesion. The patient initially presented with a lesion measuring approximately 1 cm in diameter, which increased over a period of two years to approximately 8 × 6 cm. This progression resulted in an extensive facial defect following three-dimensional tumor resection, creating a reconstructive challenge due to the size and location of the defect.

The surgical treatment consisted of three-dimensional tumor resection followed by reconstruction using a local rotation flap. During the procedure, the lesion was excised with a 1-cm circumferential margin. The tumor extended to the subcutaneous tissue, and invasion of the mandibular branch of the facial nerve was identified, requiring its resection. Cervical exploration was also performed, identifying three lymph nodes in the carotid triangle, which were resected for histopathological examination.

Rotation flaps represent a reconstructive option for large soft-tissue defects because they allow adjacent tissue to be mobilized toward the defect while distributing tension along the arc of rotation. In this case, the flap was designed toward the anterior

cervical region, allowing adequate advancement and approximation of the skin edges without tension.

Postoperatively, no immediate complications were reported. At 24 hours, the patient presented decreased mobility of the cheek and mild deviation of the left oral commissure, without difficulty with mastication or swallowing solid foods. At seven days, adequate flap healing was observed, allowing suture removal. Subsequent follow-up demonstrated adequate postoperative evolution.

Conclusion

The reconstruction of extensive facial defects following oncologic resection represents a significant challenge in reconstructive surgery, particularly when adequate tissue coverage and tension-free wound closure are required. In the present case, the use of a local rotation flap provided an effective reconstructive option for the large defect resulting from three-dimensional resection of the left cheek squamous cell carcinoma.

The semicircular design and extension of the flap toward the anterior cervical region allowed adequate mobilization of adjacent tissue and approximation of the wound edges without excessive tension. This approach provided appropriate coverage of the defect while preserving the continuity of the surrounding soft tissues.

The adequate postoperative healing observed in this case, with no immediate surgical complications and satisfactory evolution during follow-up, supports the use of local rotation flaps as a useful reconstructive technique for selected extensive facial defects. Careful flap planning, adequate tissue mobilization, and appropriate distribution of tension are essential to achieve successful reconstruction following oncologic resection.

Conflicts of interests

The authors declare that there are no financial, personal, or institutional conflicts of interest that could have influence the work reported in this manuscript.

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