



McGregor flap: an alternative for lower eyelid and periorbital region reconstruction

Retalho de McGregor: uma alternativa para reconstrução de pálpebra inferior e região periorbital

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■ ABSTRACT

Introduction: Lower eyelid reconstruction is a challenge for plastic surgeons. It requires knowledge of various surgical techniques and anatomy. In 1973, McGregor published the lateral periorbital zetaplasty technique, which proved to be an excellent alternative within the therapeutic reconstructive arsenal. The objective is to demonstrate the clinical applicability of the McGregor flap as an option for reconstruction of lower eyelid and periorbital region defects. **Methods:** In this retrospective, descriptive, and analytical study, seven patients underwent excision of cutaneous malignant tumors of the lower eyelid and adjacent regions and reconstruction using the McGregor flap between April 2010 and October 2016 at the Plastic Surgery Clinic of Hospital Felício Rocho, Belo Horizonte, MG. **Results:** The age of the patients ranged from 38 to 79 years, with an average of 65.4 years. Five of the seven patients (71.4%) were women. At the anatomopathological examination, 85.7% of the cutaneous tumors were basal cell carcinoma, and 14.3% (n = 1) were adnexal microcystic carcinoma. Four patients underwent Mohs micrographic surgery for excision of the lesions. In one patient, the Matsuo technique was used for palpebral reconstruction of the posterior lamella. In the follow-up averaging 36.3 months, the conditions of the six patients (85.7%) progressed well without complications, with satisfactory results; one patient developed postoperative ectropion owing to the deformation of the cartilage graft of the ear used in the reconstruction. **Conclusion:** The McGregor flap presented adequate clinical applicability, making it an excellent alternative for reconstruction of lower eyelid defects and adjacent tissues with good aesthetic and functional results.

Keywords: Surgical flaps; Reconstructive surgical procedures; Eyelids.

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■ RESUMO

Introdução: A reconstrução da pálpebra inferior é um desafio para o cirurgião plástico. Exige um conhecimento das variadas técnicas cirúrgicas e da anatomia. Em 1973, McGregor publicou a zetaplastia periorbital lateral que se mostra como excelente alternativa dentro do arsenal terapêutico reconstrutivo. O objetivo é demonstrar aplicabilidade clínica do retalho de McGregor como opção para reconstrução de defeitos da pálpebra inferior e região periorbital. **Métodos:** Estudo retrospectivo, descritivo e analítico de sete pacientes que foram submetidos à excisão de neoplasias cutâneas da pálpebra inferior e regiões adjacentes, sendo utilizado para reconstrução do defeito cirúrgico o retalho de McGregor, entre abril de 2010 e outubro de 2016, na Clínica de Cirurgia Plástica do Hospital Felício Rocho, Belo Horizonte, MG. **Resultados:** A idade dos pacientes variou entre 38 e 79 anos, com média de 65,4 anos, sendo cinco (71,4%) do sexo feminino. Ao exame anatomopatológico, 85,7% das neoplasias eram carcinoma basocelular e um caso (14,3%) correspondia a carcinoma microcístico anexial. Quatro pacientes foram submetidos à cirurgia micrográfica de Mohs para excisão da lesão. Em um caso foi utilizada a técnica de Matsuo para reconstrução palpebral da lamela posterior. Seguimento com média de 36,3 meses, seis pacientes (85,7%) evoluíram bem sem intercorrências com resultado satisfatório, um paciente evoluiu com ectrópio no pós-operatório por deformação do enxerto de cartilagem da orelha utilizado na reconstrução. **Conclusão:** O retalho de McGregor apresentou aplicabilidade adequada, sendo uma excelente alternativa para reconstrução de defeitos da pálpebra inferior e tecidos adjacentes, com bons resultados estético e funcional.

Descritores: Retalhos cirúrgicos; Procedimentos cirúrgicos reconstrutivos; Pálpebras.

INTRODUCTION

Reconstruction of the lower eyelid is a challenge for plastic surgeons. It requires knowledge of various surgical techniques and anatomy to obtain satisfactory functional and aesthetic results¹⁻³.

Eyelid defects can be divided into congenital and acquired and can be due to diverse etiologies, with cutaneous tumors being one of the most prevalent, especially the non-melanoma type⁴⁻⁸.

Basal cell carcinoma (BCC) is the most prevalent of the non-melanoma cutaneous tumors and has a slow growth rate. Although it is not aggressive, BCC can cause important sequelae in adjacent tissues when treated late or inappropriately⁹.

Periorbital tumors represent 10% of cutaneous tumors. BCC is the most common neoplasm in the periorbital region, accounting for 80-90% of palpebral tumors. The lower eyelid and the medial canthus are the most commonly affected regions. These periorbital cutaneous tumors can be difficult to manage;

nevertheless, they are commonly treated with surgical excision¹⁰.

Several lower eyelid reconstruction techniques have been developed over the last decades. The choice of the reconstruction technique should be guided by the size of the defect and involvement of the anterior and posterior lamellae. Simple closure should be conducted when possible, and lateral canthotomy may aid in the medial advancement of tissues¹¹⁻¹³.

In 1966, Mustardé¹⁴ used several techniques according to the principle of advancement of the lateral skin of the face in the medial direction for correction of defects of the lower eyelid. There is sagging skin in the lateral region of the face. Its advancement is limited, and if no measures are taken to reduce tension in the flap, it will tend to return to the original position.

In 1973, McGregor¹⁵ proposed a technique for lower eyelid defects consisting of lateral periorbital zetaplasty to advance the tissues medially with the intention of reducing the tension in the flap. It is shown

as an excellent alternative within the therapeutic reconstructive arsenal for complex lower eyelid defects.

OBJECTIVE

To demonstrate the clinical applicability of the McGregor flap as an option for reconstruction of defects of the lower eyelid and periorbital region.

METHODS

This retrospective, descriptive, and analytical study was based on the review of medical records and photographic documentation of seven patients submitted to excision of cutaneous tumors of the lower eyelid and adjacent regions. The surgical defects were reconstructed using the McGregor flap between April 2010 and October 2016 at the Plastic Surgery Clinic of Hospital Felício Rocho, Belo Horizonte, MG.

The following criteria were analyzed: age at the date of surgery, sex, lesion topography, pathological diagnosis of the lesion, date of and adopted surgical procedure, follow-up, and any complications related to the procedure.

Data were entered into the Microsoft Office Excel spreadsheet software for statistical analysis. The related literature was reviewed, and the databases consulted were PubMed and LILACS.

The principles of the Declaration of Helsinki revised in 2000 and Resolution 196/96 of the National Health Council were followed, and the patients analyzed completed the informed consent form. No conflicts of interest were observed, and there were no sources of financing.

Surgical technique

With the patients under mild sedation and local anesthesia, the surgical procedure began with creation of a lateral incision following the curvature of the eyelid, which extended to the anterior region of the preauricular hair-line, with the length of the incision being dependent on the width of the defect to be compensated. The curvature of the incision was important to provide a vertical length appropriate to the flap.

Zetaplasty was performed at the lateral end of the incision, with the width of the defect corresponding to the central limb of the Z. The lateral descending limb and the ascending limb of the Z had the same length as the common limb and formed an angle of 60° with the latter (Figure 1).

The detachment of the flaps followed the subcutaneous dissection plane. Lateral canthotomy was performed for advancement of the flap and covering of

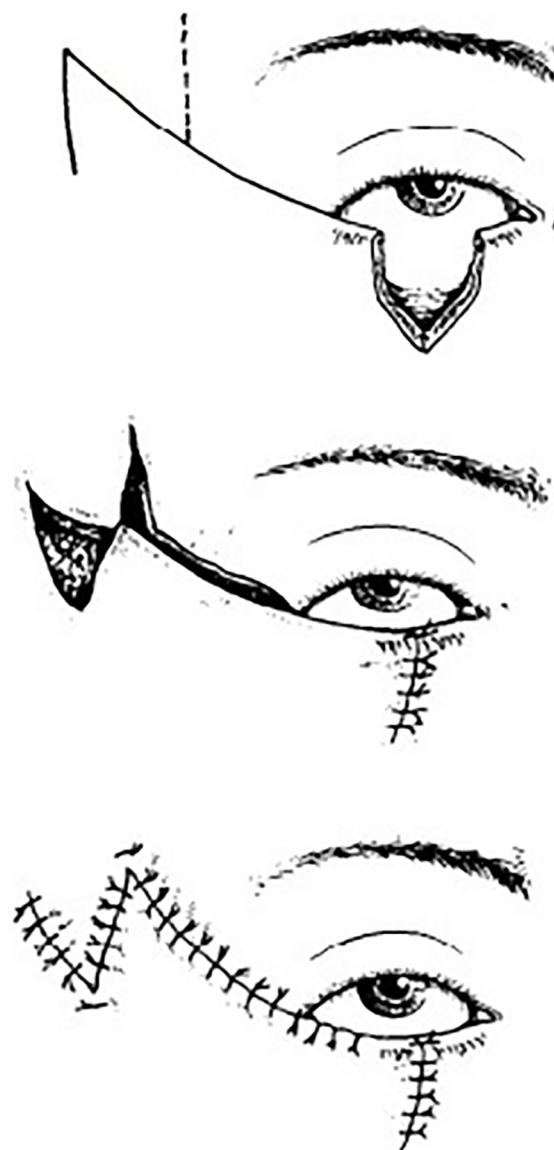


Figure 1. Eyelid reconstruction following subtotal resection of the upper or lower eyelid. Adapted from McGregor IA. *Br J Plast Surg.* 1973;26(4):346-54.¹⁵

the eyelid defect. After interpolation of the flaps, any excess skin was trimmed.

RESULTS

Between April 2010 and October 2016, seven patients underwent excision of cutaneous malignant tumors of the lower eyelid and reconstruction of the surgical defect using the McGregor flap (Table 1 and Figure 2, 3 and 4). The patients' age ranged from 38 to 79 years, with an average of 65.4 years. The study included five female patients (71.4%) and two male patients (28.6%).

Table 1. Review of medical records of the seven patients.

| Patient | Age (Years) | Sex | Lesion location | Anatomopathological Diagnosis | Surgery | Follow-up/Complications |
|---------|-------------|--------|--|-------------------------------|--|--|
| 1 | 79 | Male | Lower right eyelid | Nodular BCC | 08/04/2010 Excision of the lesion with sacrifice of the catheterized lacrimal canaliculus + McGregor flap | 52 months Without complications |
| 2 | 69 | Female | Lower right eyelid | Sclerodermiform BCC | 30/03/2011 Excision of the lesion + Matsuo's technique + McGregor flap | 14 months Ectropion from deformation of the cartilage graft |
| 3 | 66 | Female | Lower right eyelid and nasal region | Adnexal microcystic carcinoma | 11/04/2011 Mohs micrographic surgery + McGregor flap | 71 months Without complications |
| 4 | 77 | Male | Right lateral region of the nasal dorsum | Sclerodermiform BCC | 04/10/2013 Mohs micrographic surgery + McGregor flap | 44 months Without complications |
| 5 | 59 | Female | Left medial orbital zygomatic margins | Solid BCC | 16/12/2013 Mohs micrographic surgery + McGregor flap | 42 months Without complications |
| 6 | 38 | Female | Lower right eyelid | Nodular BCC | 24/09/2015 Mohs micrographic surgery + McGregor flap | 22 months Without complications |
| 7 | 70 | Female | Lower left eyelid | Solid BCC | 21/10/2016 Excision of lesion + McGregor flap | 9 months Without complications |

BCC: Basal Cell Carcinoma.

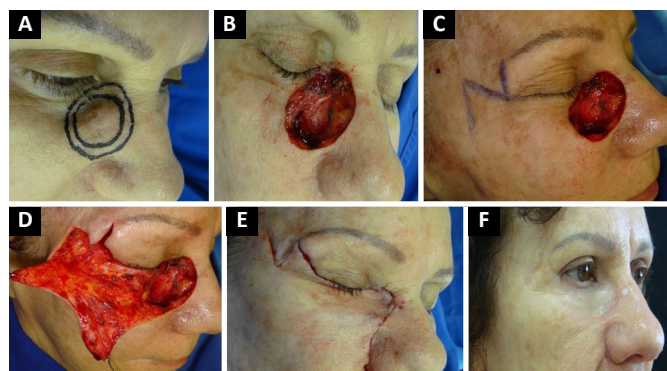


Figure 2. A: Preoperative marking for Mohs micrographic surgery; B: Loss of substance; C: Reconstruction planning with the McGregor technique; D: Flap detachment; E: Flap advancement and interpolation; F: 3-year postoperative image.

In relation to the topography of the lesions, one was located on the left medial orbital zygomatic margin (14.3%), one on the right lateral region of the nasal dorsum (14.3%), one on the right lower eyelid and nasal region (3%), three on the lower right eyelid (42.8%), and one on the lower left eyelid (14.3%).

Based on the pathological examination findings, two lesions were diagnosed as solid BCC (28.6%), two as sclerodermiform BCC (28.6%), and two as nodular

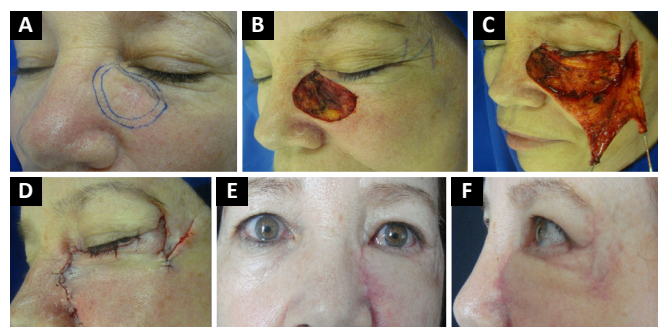


Figure 3. A: Preoperative marking for Mohs micrographic surgery; B: Loss of substance and reconstruction planning with the McGregor technique; C: Flap detachment; D: Flap advancement and interpolation; E, F: 1-month postoperative images.

BCC (28.6%) (85.7% BCC in total) and one as adnexal microcystic carcinoma (AMC) (14.3%).

Four patients underwent Mohs micrographic surgery for lesion excision and reconstruction using the McGregor flap (57.1%); the other three patients underwent conventional lesion excision and reconstruction using the McGregor flap (42.9%). In one patient, the lacrimal canaliculi had to be sacrificed and catheterized.

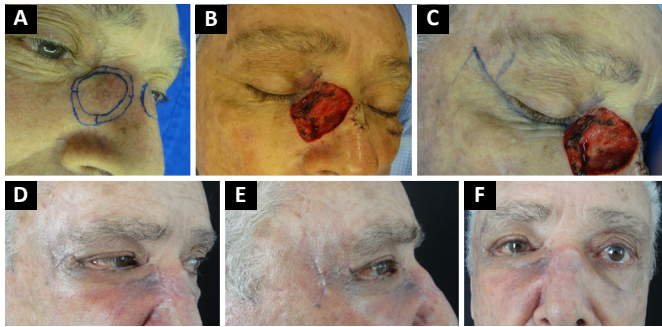


Figure 4. A: Preoperative marking for Mohs micrographic surgery; B: Loss of substance and reconstruction planning with the McGregor technique; C: Flap detachment; D: Flap advancement and interpolation; E, F: 1-month postoperative images

In another patient, the Matsuo et al.¹⁶ technique was used for palpebral reconstruction of the posterior lamella using a cartilaginous graft of the ear concha.

The patients were followed up for periods varying from 9 to 71 months with an average of 36.3 months. During the follow-up, there were no cases of tumor recurrence. The conditions of the six patients progressed well without complications, with satisfactory results (85.7%); however, one patient evolved with postoperative ectropion (14.3%) due to deformation of the graft cartilage of the ear used in the Matsuo technique for reconstruction. This patient refused correction of the complication.

DISCUSSION

The number of diagnoses of non-melanoma skin cancer is higher than that of all other malignancies combined; this has become a relevant public health issue owing to the increasing incidence and costs associated with this type of cancer¹⁷. This fact brings our attention to the possibility of risk reduction associated to preventive measures and promotion of healthy sun exposure.

One patient was diagnosed with AMC, which is an uncommon tumor with approximately 700 cases described in the literature worldwide. It is a neoplasia of the eccrine sweat glands with a slow growth and a low index of metastases that affect the head and neck. Owing to its subclinical evolution, AMC is often confused with benign cutaneous tumors, resulting in late diagnoses and higher rates of incomplete treatment. Recurrences may occur up to 30 years after excision; therefore, prolonged follow-up is recommended¹⁸.

The histological distribution of the tumors excised in this study was similar to that in the literature on periocular tumors with predominance of BCC (85.7% of the cases). The most common site of the tumors also coincided with that of the literature, with 71.4% of the tumors being found in the lower eyelid, 14.3% in the zygomatic margin, and 14.3% in the nasal dorsum¹⁸.

BCC affecting the periocular region has a higher rate of recurrence than other topographies, most of which are not locally aggressive and invasion of the orbit occurs in less than 5% of cases¹⁹. In this study, no case of tumor recurrence was identified, although some patients had a short-term follow-up.

The preservation of healthy tissues as well as the high cure rates are important considerations in the surgical treatment of periocular cutaneous tumors. The surgical treatment of BCC commonly includes techniques, such as curettage, conventional excision, cryosurgery, laser-associated cryosurgery, and Mohs micrographic surgery.

The conventional resection of the cutaneous tumor lesions in this series represented 43% of the cases. The literature reveals that this modality remains the most commonly used procedure, accounting for 75% of surgeries performed on BCC²⁰.

In the present study, Mohs micrographic surgery was performed in four patients (57%). Surgical indications depend on histology, size, and topography of the lesion and previous treatments²¹. Studies show that this approach has higher cure rates. The rate of BCC recurrence 5 years after conventional surgery is 10 to 17%, whereas that of tumors resected by Mohs micrographic surgery is 1 to 5.6%²².

Eyelid reconstruction aims to protect the cornea, preserve sight, and maintain facial symmetry. The choice of the technique to be used should take into account the size and position of the defect and the quality of the adjacent skin. Options for reconstruction include grafts and various flaps. It is important to consider the traction vectors of the flaps over the eyelid to avoid complications, such as lagophthalmos and ectropion. The color and texture of the skin selected for grafts and flaps should also be considered to preserve the function and aesthetics of the eyelid²³⁻²⁵.

The technique described in 1973 by McGregor was originally indicated for the reconstruction of V-shaped defects up to two thirds of the width of the eyelid, being applied to both the lower and upper eyelids. After 15 years of using the flap, McGregor presented good surgical results, with good-quality scars and lateral eyelids with a natural appearance¹⁵. This study used the technique presented by McGregor as a basis for reconstruction of the lower eyelid and adjacent regions with satisfactory results.

This flap minimizes the tension of the lower eyelid, recruiting tissue laterally to the defect and not below. Since it involves minor detachment of the tissues, this flap has shown lower risks of seroma, hematoma, and necrosis than the technique of Mustardé.

In 2010, Chedid et al.²⁶ conducted a retrospective study that analyzed 137 patients who underwent

resection of neoplastic lesions of the lower eyelid and immediate reconstruction at the National Cancer Institute in Rio de Janeiro between 2005 and 2010. In 11.2% of the patients, the selected reconstruction technique was the McGregor flap.

In 2013, Tomassini et al.²⁷ investigated seven patients who underwent periorbital tumor excision and reconstruction with periorbital zetaplasty and observed good functional and aesthetic results, with no need for reoperation in any of the cases.

In 2015, Mukundan et al.²⁸ described a series of nine patients with successful reconstructed malar eyelid defects using the McGregor technique associated with postoperative hyperbaric oxygen therapy.

In 2016, Özkaya Mutlu et al.¹⁹ and Uemura et al.²⁹ each showed a case of reconstruction with lateral periorbital zetaplasty, obtaining satisfactory results.

In addition to the lateral periorbital zetaplasty for anterior lamellar reconstruction, the technique described by Matsuo et al.¹⁶ in 1987 was used in one patient in this study to reconstruct the posterior lamella using a cartilage graft from the ear concha. In this technique, the cartilage in contact with the bulbar conjunctiva undergoes spontaneous epithelization, eliminating the need for mucosal grafting to reconstruct the conjunctiva.

The epithelization of the cartilage accompanied by the perichondrium is faster and more effective than that when the bare cartilage is used. Consequently, this technique reduces the surgical time and morbidity associated with the mucosal graft donor area. Furthermore, the choice of the cartilage of the ear shell is interesting because of the shape of the structure that adapts well to the palpebral region, delicacy of the tissue, and ease of obtaining the graft.

Preservation of eyelid function is one of the main objectives of reconstruction, allowing protection of the eyeball and tear system. Thus, measures should be taken during surgical planning to avoid complications, such as ectropion, entropion, epiphora, lagophthalmos, and exposure of the cornea. Among the patients included in this study, one developed ectropion. In this patient, the Matsuo technique was used; the complication may be related to late deformation of the cartilage graft.

Ectropion increases exposure of the palpebral and bulbar conjunctivae, predisposing patients to dry eye and tearing. As previously mentioned in the surgical technique of the McGregor flap, the ascending curvature of the incision and the direction of the traction vectors horizontally or laterally can reduce the risks of postoperative ectropion.

CONCLUSION

The McGregor flap presented an adequate clinical applicability in the reported series, making it an

excellent alternative to compose the arsenal of surgical techniques of plastic surgeons for the reconstruction of defects of the lower eyelid and adjacent tissues with good aesthetic and functional results.

COLLABORATIONS

ACMA Analysis and/or interpretation of data; statistical analyses; final approval of the manuscript; conception and design of the study; completion of surgeries and/or experiments; writing the manuscript or critical review of its contents.

JCRRRA Analysis and/or interpretation of data; final approval of the manuscript; completion of surgeries and/or experiments; writing the manuscript or critical review of its contents.

NAP Analysis and/or interpretation of data; statistical analyses; final approval of the manuscript; conception and design of the study; completion of surgeries and/or experiments; writing the manuscript or critical review of its contents

LCJ Analysis and/or interpretation of data; statistical analyses; conception and design of the study; writing the manuscript or critical review of its contents.

EHP Analysis and/or interpretation of data; statistical analyses; final approval of the manuscript; writing the manuscript or critical review of its contents.

RPLF Analysis and/or interpretation of data; statistical analyses; final approval of the manuscript.

AFSF Analysis and/or interpretation of data; final approval of the manuscript; completion of surgeries and/or experiments; writing the manuscript or critical review of its contents.

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