

Reconstruction of the periorbital region defects following excision of basal cell carcinomas

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ABSTRACT



The periorbital region has a complex anatomy and the reconstruction process of this area requires a precise approach, in order to preserve vision and offer a good esthetic aspect. The pathological processes that occur in this area are diverse and include trauma, tumors, burns, radiation, infections and congenital anomalies. This paper presents the surgical experience of a plastic surgery department in choosing the proper surgery for reconstructing periorbital defects after tumors excision and the possible complications.

The used methods were local advancement and rotational flaps associated with full thickness skin grafts in small defects. Regarding postoperative complications, ectropion developed in one patient that was corrected in another surgery.

Periocular reconstruction surgery depends not only on the defect zone, thickness and general status of the patient but also on the surgeon's experience. The main goal is to restore the periocular structures functions in order to achieve protection of eye surface and to preserve the visual acuity.

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Introduction

The periorbital region has a complex anatomy including different structures as the brow, the upper eyelid, the lower eyelid and the medial and lateral canthus [1].

Defects of this area require a detailed approach because of the complex anatomy and of the diversity of pathological processes that occur in this area, secondary to trauma, tumors, burns, radiation, infections and congenital anomalies [2].

Eyelids represent one of the most difficult regions to reconstruct considering the anatomy. These are divided in 2 lamellae, anterior that contains the skin and muscle, and posterior that contains the tarsus and conjunctiva. The reconstruction process is difficult due to the protective function of the periocular tissue in preserving vision. The main goal of this process is the reconstruction of the three-dimensional anatomy of the eyelids, which include protection of the eye surface from trauma, preservation of

the tear film and excretion with an intact tear excretory apparatus, restoration of the tars structure and of the lid edges, and maintenance of the medial and lateral ligaments for movement and stability of the eyelid [3]. Preservation of the normal function is very important, usually takes priority over the esthetic result. Failure in reconstruction of the eyelid function will produce discomfort and will lower the visual performance of the patient.

The principles of surgical reconstruction are generally the same whether the defect arises from excision of a tumor, trauma, or other previous surgical procedures [4].

The surgical technique chosen for this area depends on the zone of the defect, the extent of the eyelid defect, the thickness of the defect, the age and general health of the patient and the surgeon's experience [5]. The surgical techniques applied include: primary closure, split thickness skin grafting, local flaps and combinations of these.

The aim of this paper is to present our surgical experience in choosing the right surgical method for reconstructing periorbital defects and possible complications.

Materials and methods

This paper presents a non-comparative retrospective case series study of seventeen patients treated in the Plastic Surgery Department of Emergency Clinical Hospital “Prof. Dr. Agrippa Ionescu” for periorbital defects. There have been approached different methods of reconstruction of periorbital area defects after excisions of basal cell carcinomas. The periorbital area included the brow, the upper and the lower eyelid, and the medial and lateral canthus.

The methods of reconstruction were chosen according to the zone of the defect, the dimension and the thickness of the defect, recurrences, and the age and general health of the patient.

Results

All the reconstructed defects were after excision of tumors, especially basal cell carcinomas: primary or recurrent.

Analysis of the reconstructive methods in our patients show that in medial canthus defects there was no possibility of primary suture and the only options remained full thickness skin grafts or local flaps. In two patients the defect was covered using a full thickness skin graft from the preauricular area. The esthetic and functional result was very good after 6 months with no sign of recurrence (Figure 1).



Figure 1. (A) Medial canthus defect covered with a full thickness skin graft. (B) Postoperative aspect at 10 days

In another two cases, due to the size and the depth of the defect was used as reconstruction method the paramedian forehead flap and in one case an advancement flap from the glabellar area associated with a nasolabial flap (Figures 2 and 3). The paramedian forehead flap was not an option in this case because the patient had an invasion of a basal cell carcinoma in the flap pedicle.



Figure 2. (A) Defect of the medial canthus. (B) Reconstruction of the medial canthus using a paramedian forehead flap- 2 weeks postoperatively



Figure 3. (A) Basal cell carcinoma of the medial canthus with invasion in the paramedian forehead flap pedicle. (B) medial canthus defect. (C) Reconstruction using an advancement flap from the glabellar area and a nasolabial flap

Considering the lower eyelid, we had six cases, one with a small and superficial defect of the anterior lamella where the primary suture was possible and a second patient with a superficial defect involving 50% of the anterior lamella that was reconstructed using a cutaneous advancement flap. The third patient had a defect of the anterior lamella that involve 70% of the lower eyelid. This was reconstructed using a transposition flap from the upper eyebrow (Fricke flap), with a good esthetic and functional result (Figure 4).



Figure 4. Reconstruction of the anterior lamella of the lower eyelid using a Fricke flap

The fourth patient had a 60 % full thickness defect of the lower eyelid including the lateral canthus. The lateral

canthus was reconstructed using a periosteal flap and for the lower eyelid defect was used a tarsal graft from the contralateral upper eyelid. Postoperative results were good with no functional deficit. The fifth patient had a full thickness defect of the lower eyelid involving approximately 70%. This was reconstructed using a periosteal strip elevated from the orbital rim and reflected medially, followed by a Tenzel flap.

The sixth patient had an invasive basal cell carcinoma of the lower lid that lead to a total full thickness defect where reconstruction of the tarsus and conjunctiva was realized using a composite cartilage graft from the nose septum that was covered with a Mustarde cheek rotation flap (Figure 5).



Figure 5. Lower eyelid full thickness defect of the lower eyelid and reconstruction using a with nasal septum graft and a Mustarde cheek rotation flap

Considering the upper eyelid, we had two patients with 50% full thickness defects. In one patient reconstruction was made using a two-stage surgery with a Cuttler-Beard flap from the lower eyelid. The main disadvantage of this flap was, in our patient perspective, the impossibility of opening the eye for a three-week period (Figure 6). In the other patient the reconstruction of the upper eyelid was realized using a periosteal flap from the superior border of the orbit. Postoperative aspect was good with no other complications.

There were also 2 cases with involvement of the lateral cantus. One with superficial defect and reconstruction using a rotation skin flap and another patient with a deeper defect that required also reconstruction of the lateral part of the lower eyelid tarsus. In this case the lateral canthus was reconstructed using a periosteal flap from the lower part of the orbit that was covered using a rotational flap from the temporal region.

We had also two cases with defects involving the upper brow that were covered using local flaps.



Figure 6. (A) Defect of the upper eyelid after excision of a basal cell carcinoma. (B) reconstruction of anterior and posterior lamella of the upper eyelid using a Cutler Beard flap. (C) Section of the Cutler Beard flap after 3 weeks

Regarding postoperative complications, ectropion occurred in two patients with lower eyelid defects, the complication being corrected in the patient with the Mustarde flap in another surgery by medial suspension.

There are also situations when the tumor realizes an invasion into the eyeball or the adjacent structures (muscles, nerves) and the only option remains exenteration and covering of the orbit using a local flap or a skin graft. We had one case of an 85-year-old woman that was admitted with an ulcerated basal cell carcinoma of the left medial canthus with invasion in the upper and lower eyelid and nasal root. CT-scan showed that the tumor invaded also the medial rectus muscle of the orbit. Oncological consultation didn't recommend any other systemic treatment or radiotherapy, the only suggestion being surgery with orbital exenteration. The tumor was excised with 1 cm oncological margins that included the exenteration of the orbit and defect coverage using a median forehead flap and local skin flaps. The patient is discharged with a good outcome having no recurrence at six months' follow-up (Figure 7).



Figure 7. Orbital exenteration and defect coverage with a median forehead flap and local skin flaps.

Discussions

Reconstruction of the periocular defect requires a good understanding of the orbital and eyelid anatomy in order to have better results and avoid complications. Ophthalmologic consultation is always necessary before the surgery, being an important step in planning the steps of reconstruction [2]. Identifying the pedicles and local vascularization of the local flaps is also important, and can be realized by using a thermographic camera, that shows the cutaneous blood flow [6]. During surgery is very important to keep foreign bodies off the ocular surface, to protect the eye from light and to prevent the cornea from drying by using ointments, these being the small steps that avoid most of the postoperative complications. Surgery can be realized through local anesthesia, when the defects are small and superficial or general anesthesia when defects are large and involve extensive flaps [7]. In our study, we used local anesthesia in patients with superficial defects of

the periocular area where skin grafts of small local flaps were used.

Regarding anatomy, the upper and lower eyelids are similar in structure, with an anterior layer (lamella) formed of skin and muscle and a posterior lamella consisting of conjunctiva, tarsal plate, and eyelid retractors which gives stability [8]. Reconstruction of these structures should be realized with appropriate substitutes in order to provide support and good integration.

Reconstruction of the anterior lamella defect is usually realized using local flaps because these provide a good cover having a minimum contraction and scar depression with a good cosmetic result. Full thickness skin graft can be an option especially in situations where ectropion is encountered and additional tissue could relax the traction [9]. Defect of the posterior lamella are usually present in full thickness defects of the eyelid.

Considering these defects there is an algorithm that helps in choosing the right option of treatment. If the defect is less than 30%, primary closure is used associated with canthotomy if necessary. If the defect is between 30% to 50% of the eyelid, a Tenzel semicircular flap could be an option or a sliding tarsoconjunctival flap covered by a skin graft [7]. The Tenzel flap is a semicircular flap used in reconstruction of the lower or upper eyelid that consist of skin and muscle being advanced and rotated from the lateral canthus [3].

At this level the lateral canthal tendon is section in order to provide more mobility. If the eyelid defects are more than 50% a sliding tarsoconjunctival flaps from the opposite eyelid is realized, Hughes flap for reconstructing the lower eyelid or Cutler Beard flap for reconstructing the upper eyelid [7]. Our patient considered that the main disadvantage of this type of flap is the impossibility of eye opening during three weeks between the first surgery and the sectioning of the flap. If the defect involves more than 75% of the eyelid the reconstruction becomes more difficult, as was also the case of one of our patients, being necessary a reconstruction of the tarsus and conjunctiva with a composite graft, harvest form the ear or nasal septum [10]. This graft is usually covered using a cheek advancement flap that is anchored to the bone in order to avoid further ectropion.

Reconstruction of the medial canthus represents a challenge when the defect is close to the lacrimal system. This should be protected using a silicone tube [11]. Covering of the defects in this area can be realized using local advancement flaps or median forehead flap, that provide good vascularization and integration [12]. Full thickness skin grafts are usually used in small defects with good esthetic results.

Lateral canthus can be reconstructed using local advancement and rotation flaps. It is very important to check the lateral canthal tendon, if is present but lax a

canthopexy is realized, if is disrupted, reconstruction using canthoplasty is performed [7].

Regarding the eyebrows, reconstruction is usually realized using local flaps, in order to not disrupt the growing of the hair. In very rare situations, when local flap are not available, full thickness skin grafts are used, but these provide a poor esthetic result [2].

Complications develop usually in reconstruction after large defects and consist in corneal abrasion, lid malposition with ectropion or entropion or trichiasis [7, 9]. All of these can be avoided with a good surgical plan and with respecting the principles of periocular reconstruction.

Conclusions

Periocular reconstruction represents a challenging procedure for every plastic surgeon, requiring special attention to restore eyelid function and also to provide a good cosmetic appearance.

Even if is important to respect the algorithm of reconstruction, the surgeon should choose the optimal technique for the patient in order to avoid complications and achieve the best result.

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