Radiotherapy represents a major problem in facial surgery. Orbital and periorbital radiation therapy causes a contraction of the soft tissues. Scarring with ectropion is the most severe complication, with shrinking of the anterior lamella, skin dystrophy, muscle atrophy, and alteration of the remaining soft tissues. Goals for reconstruction include correction of distorted orbitofacial tissues and the restoration of orbital structures. The management of these patients is not standardized. We suggest systematically using a combined approach of surgery and lipofilling to restore the orbital deformity and dystrophy, respectively. For this purpose, we present the case of a 65-year-old woman with asymmetry of the orbital regions and severe lower eyelid cicatricial ectropion due to multiple radiation treatments in childhood for an extensive cavernous hemangioma of the right side of the face. We performed a reconstructive procedure using a tarsal strip technique in association with contralateral upper eyelid graft to correct the extensive retraction of the right lower eyelid and lid asymmetry. Subsequently, the patient underwent lipofilling to correct the post-radiotherapy dystrophy. Skin texture, softness, and elasticity greatly improved with further symmetrization. The combined treatment with surgery and lipofilling can significantly improve the functional and cosmetic outcome of shortened and dystrophic eyelids with a successful result with regard to post-radiotherapy retraction.

Ectropion is the most frequent eyelid malposition, characterized by an eyelid margin eversion. It occurs most often in the lower eyelid. It is classified according to its anatomic features as involutional, congenital, cicatricial, paralytic, or mechanical. It presents with 4 degrees of severity. The complications are tarsal conjunctival exoposition, epiphora, chronic conjunctivitis, and everted punctum from the lacus lacrimalis. Chronic ectropion causes keratinization of the conjunctiva, which contributes to further ocular irritation.1

We describe a straightforward surgical technique for the treatment of severe cicatricial ectropion and eyelid dystrophy due to radiotherapy (RT). RT represents a major problem in facial surgery, because it suppresses skeletal growth and induces contraction of the remaining soft tissues in the orbit.2 The management of these patients has never been standardized. We systematically suggest a combined approach of surgery and lipofilling to repair the orbital deformity and dystrophy.

Case Report

A 65-year-old woman had asymmetry of the orbital area and severe lower eyelid cicatricial ectropion (Fig 1) due to multiple radiation treatments, occurring when she was aged 6 months and 2 years. RT was used to treat an extensive cavernous hemangioma on the right side of the face. When the patient was aged 35 years, a chronic radiodermatitis developed in the orbital region with a severe retraction of the upper and lower right eyelids, which worsened to third-degree ectropion. When she was aged 60 years, lower eyelid cicatricial ectropion occurred because of the shrinking of the anterior lamella, exposure of the tarsal conjunctiva, and chronic conjunctivitis. At age 65 years, she needed full-thickness reconstruction of the lower eyelid and eyelid symmetrization.

Before our assessment, the patient underwent many facial esthetic procedures with no satisfactory results.
Surgical Technique

We planned to perform surgical treatment for the ectropion using a right lateral tarsal strip canthoplasty. After lower eyelid infiltration with local anesthetic (2% lidocaine with epinephrine), we exposed the inferior fornix and inferior tarsal region. We placed an incision between the inferior tarsal border and the inferior fornix, from the lateral canthus to the lateral orbital rim, making a lateral canthotomy; the dissection of the skin was extended above the orbicularis muscle. Meticulous dissection was performed to create an adequate flap. Dissection was carried laterally beyond the commissure to expose the superolateral retinaculum and orbicularis muscle. When the necessary release was achieved, the lateral commissure was repositioned by a suture suspension, considering the orbital morphology. We cut the tendon laterally, against the lateral orbital rim. We preserved the upper limb of the tendon and pulled the cut tendon laterally and superiorly to stretch the orbital septum. Then, we passed blunt-ended scissors in a subconjunctival manner along the inferior orbital rim and cut the lateral one-third of the septum so that the lid moved freely laterally and superiorly. We pulled the lower lid laterally under moderate tension to assess the position of the new lateral canthus on the lower eyelid. Then, we trimmed the tissues in a medial direction at the level of the lower border of the tarsal plate to create the lateral tarsal strip. A double-arm No. 5-0 Vicryl suture (Ethicon, Somerville, NJ) was placed through the lateral canthal ligament of the tarsal strip (Fig 2A). Each arm of the suture was brought through the periosteum at the level of the lateral tubercle. This way, the canthal suspension suture remains secure for a much longer period and translates to a more secure canthopexy. Two sutures of No. 5-0 Vicryl were placed toward the cephalad portion of the wound through the lateral orbital rim periosteum medially. We observed restoration of tension of the lower eyelid that raised the eyelid-cheek junction without distracting the lateral commissure and lateral lower eyelid from the globe. Once this lateral retinaculum and orbicularis suspension was performed, a very secure lower eyelid and lateral canthus were visualized. We passed a No. 6-0 absorbable suture between the gray line of the upper and lower lids at the lateral canthus to refashion the canthus (Fig 2A).

A graft of full-thickness skin was harvested from the contralateral upper eyelid to correct the extensive retraction in the lower eyelid for ectropion and asymmetry correction. After the graft was harvested and sutured into the defect, a standard pressure dressing was applied (Figs 2B, C).

All sutures were removed 1 week postoperatively (Fig 3). At 1-month follow-up, the patient had improved ocular condition and presented with symmetry, with excellent functional and cosmetic results.

FIGURE 1. Severe lower eyelid cicatricial ectropion due to multiple radiation treatments for an extensive cavernous hemangioma of the right side of the face. One should note the asymmetry, scleral show, lagophthalmos, and eyelid eversion.

At 12 months’ follow-up, the patient presented with a high satisfaction rate, with a successful morphofunctional result, no residual ectropion, no lagophthalmos, and good symmetrization (Fig 4). These benefits remained stable without recurrence of functional deficit; therefore we treated the right upper eyelid with lipofilling to correct the post-RT dystrophy.

**Lipostructure Technique**

The patient underwent liposuction of the subumbilical area under local anesthesia (10 mL of 1% mepivacaine with adrenaline). About 30 mL of fat was obtained and processed following the technique of Coleman. The adipocyte cell fraction was isolated, and a volume of about 5 mL was injected through a lipofilling microcannula at the dermohypodermal junction of the dystrophic area (Fig 5A). The results were photographically documented at 3 months (Fig 5B) and 6 months (Fig 6C). Skin texture, softness, and elasticity greatly improved, with further symmetrization of the 2 orbital regions. Twelve months later, the improvement remained stable (Fig 7).

**Discussion**

The causes of retraction of the lower eyelid include possible scar retraction and anterior lamellar insufficiency, laxity of the lower eyelid (laxity of the lateral canthal tendon or disinsertion), and middle lamellar inflammation. Any event, either iatrogenic or traumatic, that contributes to the contracture of the orbital septum will cause the contraction pulling the lower eyelid down from its normal position. Surgical treatment of ectropion of the lower eyelid can be achieved through flaps or grafts. The ideal donor site for eyelid reconstruction is the periocular region, which is characterized by the same color and thickness. Bipedicle myocutaneous flap is considered the gold standard. Its harvesting requires good-quality skin and well-represented orbicularis muscle. A drawback in the myocutaneous flap harvesting is the difficulty of associating a tarsal strip/canthoplasty because it is not easy to manipulate the lateral canthus. Our case represents a complication of external local RT of the eyelids for the hemangioma’s treatment with microcirculation damage and shrinking of the anterior lamella. Therefore both the upper and the lower eyelids were retracted and thinned withatro-


phy of the orbicularis muscle. No flap from the upper eyelid was possible.

Goals for reconstruction in patients with severe contraction of the soft tissue in the orbit after RT include the restoration of orbital structures and the
correction of distorted orbitofacial relationships. To our knowledge, the management of such patients has never been standardized. We aimed to develop a combined approach of surgery and lipofilling to repair the orbital deformity and dystrophy, respectively. We performed a straightforward type of reconstruction using tarsal strip in association with contralateral upper eyelid graft to correct the generalized contraction of the lower eyelid. In our case the most serious sequelae of the eyelid retraction were corneal exposure and asymmetry compared with the contralateral eyelid. The procedure described was appropriate and

FIGURE 4. Surgical outcomes. One should note the symmetry and correction of scleral show, lagophthalmos, and ectropion.

FIGURE 5. Lipofilling. A, Infiltration of 5 mL of adipocyte cells. B, Patient at 3 months' follow-up.
effective. In addition, we performed lipostructure to treat upper eyelid dysmorphia. The use of autologous adipose cells can greatly improve the cosmetic and functional outcome of the eyelids’ surgical treatments. In our case these benefits remained stable and long-lasting. Because the injected volume with lipostructure is small, even the early results of this procedure can hardly be attributable to a filler effect. This suggests that deep biologic interactions between transplanted fat and dermohypodermal structures occur very early.\textsuperscript{10}

The improvement in skin appearance and complete recovery 6 months after surgery seem to confirm the theoretic basis of lipofilling, which considers the adipose tissue as a reservoir of mesenchymal stem cells.\textsuperscript{11} The stem cells’ capacity to differentiate in various cellular lines could be the physiologic way to replace cells lost in atrophied tissues, as well as to ameliorate the mechanical and biologic properties of the skin.

RT has been successful in the management of complicated ocular and orbital angiomas, but late morbidity has been a problem.\textsuperscript{12} A recently developed method using a pulsed dye laser has allowed RT to be abandoned for angioma treatment. However, RT is widely used for the treatment of orbital tumors and inflammatory disease. External beam radiation therapy is the most common; it involves direct external radiation source toward the eye, sinus, and orbit, with exposure of the normal ocular and orbital tissues.\textsuperscript{13} Late RT effects on the eyelids are cutaneous telangiectasis, ciliary madarosis depigmentation, scarring with ectropion, and disturbances in the growth of eyelashes.\textsuperscript{14} Scarring with ectropion is the most serious complication because it involves severe cicatricial ectropion with shrinking of the anterior lamella, skin

\textbf{FIGURE 6.} Preoperative image of patient (A) and results at 12 months postoperatively (B) and 6 months after lipofilling (C).

FIGURE 7. Patient at 12 months after lipofilling.

dystrophy, muscle atrophy, and contraction of the remaining soft tissues.

There are numerous methods for correcting cicatricial ectropion. Older methods no longer used include wedge resection and the Kuhnt-Szymanowski procedure. Many authors prefer a lateral canthal-tightening procedure whenever feasible. Surgery at the lateral canthus avoids the possibility of lid notching with noncanthal procedures and decreases the risk of trichiasis. The most common variation of lateral canthal tightening is the lateral tarsal strip procedure, which provides a canthotomy of the lateral canthus and cantholysis, so the lower lid is freely mobile and the lateral strip of tarsus can be secured to the periosteum. Several “enhanced” tarsal strips (ie, tarsal strips without the traditional lateral skin excision) are said to help to correct some degree of cicatricial ectropion, as well as the association of Z-plasties, V-Y-plasty, advancement flaps, skin grafts, and lateral canthoplasty with an anchor system. Surgical complications may include bleeding, hematoma, infection, wound dehiscence, pain, and poor positioning of the tarsal strip. If the procedure is well performed, the outcome and prognosis are usually excellent.

Adipose tissue grafting to irradiated eyelids has never been described in the literature. Many authors have shown benefits in breast reconstruction (with or without irradiated tissues), facial hemiatrophy, and treatment of burn scars. Caviggioli et al reported a case in which cicatricial ectropion in the lower lid from chemical burns was successfully treated with injection of adipose tissue, with encouraging clinical results. They stated that lipostructure seems to complete and improve the results of the standard surgery. We believe that associated treatments (ie, surgery and lipostructure) can capitalize on the benefits of different techniques with exponentially greater results.

The reported case shows that the association of surgery and lipostructure can significantly improve the functional and cosmetic outcome of retracted and dystrophic eyelids with optimal care for post-RT retractions (Figs 6, 7). Moreover, the advantage of the techniques is not only the high cure rate, but also that both treatments are performed on an outpatient basis. We would like to add that an easy algorithm, including a lateral tarsal strip for lid positioning, augmentation of the anterior lamella by skin graft, and lipostructure to improve skin quality, could represent a good practice that is systematically applicable in cases of eyelid retraction from RT.

References