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# Case report: Improving quality of life through hyaluronic acid-based fillers after orbital cancer treatment

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**Background:** Myoepithelial carcinoma is a very rare yet aggressive tumor in children. Surgical intervention and local radiotherapy often lead to post-therapy complications, affecting both the aesthetic and functional quality of life in survivors. Hyaluronic acid (HA) dermal fillers offer a minimally invasive option to improve the appearance and quality of life for these patients once they are declared tumor-free.

**Case presentation:** We present the case of an 18-year-old girl with a history of myoepithelial carcinoma in the right upper orbit, diagnosed at the age of 8. The patient underwent surgery to remove the tumor and lacrimal gland, followed by chemotherapy and radiotherapy. A complete response to treatment was achieved, and the patient was monitored with regular clinical and radiological exams for 5 years, after which she was declared tumor-free and followed for late effects of therapy. Post-surgical radiotherapy resulted in atrophy of the upper orbital frame and functional complications. The patient exhibited upper eyelid retraction, ptosis, continuous lacrimation, and conjunctival redness. Ten years after treatment, the patient underwent dermal filler injections using Aliaxin<sup>®</sup> Essential Volume (A<sub>EV</sub>) and Aliaxin<sup>®</sup> Superior Volume (A<sub>SV</sub>) to address the aesthetic impairment of the upper right orbit. A<sub>SV</sub> was administered using a 22G x 50mm cannula on the periosteum of the superior orbital frame, entering from the outer canthus. A<sub>EV</sub> was injected with a cannula into the muscle, also entering from the outer canthus. Before treatment, the patient exhibited upper eyelid retraction, ptosis, continuous lacrimation, and conjunctival redness. Following the injections, improvements were observed in all pre-treatment symptoms. The closing ability of the upper eyelid was restored, along with superior orbital volume and symmetry. Enhanced eyelid function improved eye hydration, reduced redness in the conjunctiva, and led to better vision and overall quality of life.

**Conclusion:** To our knowledge, this is the first reported case of using dermal fillers to treat ocular changes resulting from cancer treatment. Injections of A<sub>EV</sub> and A<sub>SV</sub> provided both aesthetic and functional improvements.

## KEYWORDS

dermal filler, hyaluronic acid, aesthetic medicine, post-surgical complication, myoepithelial carcinoma

## Introduction

Dermal fillers, particularly hyaluronic acid (HA)-based formulations, are widely recognized for their effectiveness in aesthetic medicine. However, their application in post-oncological settings remains underexplored. Traditional reconstructive approaches after oncological surgery often involve invasive techniques, yet there is a growing interest in minimally invasive procedures that restore both aesthetics and function. Recent advancements in cross-linked HA fillers, such as BDDE-cross-linked gels, offer significant soft tissue augmentation with minimal complications (1). Despite these advances, the use of such fillers to correct deformities following tumor treatments, especially in pediatric and young adult cancer survivors, is under-documented.

Improvements in early cancer detection and treatment have significantly increased survival rates, with 5-year survival rates for children aged 0-14 now exceeding 80% (1-3). As survival rates rise, maintaining quality of life post-treatment becomes paramount, as many patients live with long-term effects from the disease and its treatment (2). Surgery, chemotherapy, and radiotherapy can cause chronic conditions, including scarring, skin changes, and damage to mucosal barriers, often resulting in altered physical appearance (2, 4-8). These complications can be particularly severe for childhood cancer survivors, where functional and cosmetic issues involving muscle and soft tissues are common. Ocular and visual complications, for example, often arise from surgery and radiotherapy. Ocular malignancies pose unique challenges due to long-term aesthetic and functional changes in structures like the eyelid and lacrimal gland (5). Myoepithelial carcinoma is a very rare but aggressive tumor that can occur in the orbital region, although this is extremely rare (9-11). The multimodal treatment approach, including surgery, chemotherapy, and radiotherapy, demands expertise from a multidisciplinary team to balance optimal results with minimizing side effects (11, 12). Surgery often leads to noticeable changes in periocular tissues, and radiation in the head and neck may further exacerbate complications such as dry eye syndrome and corneal damage (12).

Aesthetic treatments, including dermal fillers, botulinum neurotoxins (BoNTA), thread lifts and laser therapies, are increasingly being used to improve the quality of life in cancer patients experiencing physical changes (1, 13). However, it is crucial to ensure these treatments do not interfere with ongoing cancer therapies or exacerbate immunosuppression. Although highly effective, surgical operations or the use of thread lifts are not the first treatment choice for all the patients, as they require anesthetic procedures and can be considered as invasive approaches. On the other hand, the use of BoNTA can represent an effective and non-invasive approach (14). However, the duration is relatively short requiring applications every 3-5 months and the injection requires a high knowledge of facial anatomy to avoid any risk of potential complications (14). For patients requesting non-invasive procedures, dermal fillers, such as HA, methylcellulose, and calcium hydroxyapatite are the most widely used and guarantee long-lasting results (12-18 months after treatment) (15). However, semi-permanent fillers (e.g. calcium hydroxyapatite) could display a higher rate of inflammatory

reactions, such as nodules or granulomas due to their biostimulatory mechanisms, which involves an immune-mediated response (16). Although they are considered as temporary products, HA-based fillers are effective and safe products due to their biocompatibility and potentially low immunogenic properties. HA, a naturally occurring linear polysaccharide, plays a role in various biological processes depending on its molecular size, including anti-inflammatory actions and regulation of the extracellular dermal matrix (15, 17). The biophysical and rheological properties of HA fillers, such as concentration, molecular weight, G prime (G'), and Tan delta, can be customized for different clinical applications (18-20). The Aliaxin<sup>®</sup> line of fillers, consisting of BDDE-cross-linked HA hydrogels, is commercialized by IBSA Farmaceutici Italia Srl (17). Each formulation has distinct properties due to its unique composition of molecular weights and degree of cross-linking (18-23). For example, Aliaxin<sup>®</sup> Essential Volume (A<sub>EV</sub>) and Aliaxin<sup>®</sup> Superior Volume (A<sub>SV</sub>) are characterized by the highest degree of cross-linking, making them ideal for creating volume and lifting effects (24, 25). In this report, we demonstrate the successful use of BDDE-cross-linked HA gels for correcting post-oncological orbital defects. This innovative approach not only restores aesthetic outcomes but also addresses functional impairments, such as eyelid retraction and dryness. To our knowledge, this is the first documented case of HA gel use for correcting orbital deformities following lacrimal gland tumor resection in a cancer survivor, highlighting the potential role of dermal fillers in oncological rehabilitation.

## Case report

An 8-year-old female with no significant medical history presented with a 1 cm mass in the superior region of the right orbit, exhibiting no other symptoms. She was seen at the Pediatric Oncology Department of Sapienza University of Rome. A complete excision with clear margins was performed at the Maxillofacial Surgery Department, Sapienza University (Rome, Italy), followed by histological analysis. The diagnosis was lymphoepithelioma-like carcinoma, and no additional treatment was given. Five months later, the patient experienced a local recurrence. Radiological assessments, including ultrasound, Magnetic Resonance Imaging (MRI), and 18F-fluorodeoxyglucose-positron emission tomography (FDG-PET), revealed a 5 cm mass in the superior right orbit with muscle invasion. To reduce tumor size and enable a more conservative surgical approach, the patient was treated with the ICE chemotherapy regimen: ifosfamide (900 mg/m<sup>2</sup>, days 1-5), cisplatin (20 mg/m<sup>2</sup>, days 1-5), and etoposide (60 mg/m<sup>2</sup>, days 1-5). After two courses of chemotherapy, MRI confirmed partial tumor response. A complete eye-sparing surgical excision of the orbital mass was then performed. Histological revision and molecular genetic testing identified the tumor as myoepithelial carcinoma with an EWSR1 rearrangement. Patient underwent radiotherapy to the right orbit (41 Gy), followed by four courses of IVE chemotherapy (ifosfamide 3 g/m<sup>2</sup>, days 1-3; vincristine 1.5 mg/m<sup>2</sup>, day 1; etoposide 150 mg/m<sup>2</sup>, days 1-3) and two courses of VAC chemotherapy (cyclophosphamide 1,500 mg/m<sup>2</sup>, vincristine 1.5 mg/m<sup>2</sup>, adriamycin 40 mg/m<sup>2</sup>). The treatment led to a complete

response, and the patient was monitored with clinical and radiological examinations, in particular magnetic resonance imaging (MRI) every six months for five years, after which she was declared tumor-free and followed for late effects of therapy. Post-surgical radiotherapy resulted in atrophy of the upper orbital frame and cicatricial defects. The removal of the lacrimal gland required the patient to use artificial tears for lubrication. At 18 years of age, in December 2018, the patient underwent treatment with Aliaxin<sup>®</sup> to address the orbital structural changes caused by tumor removal. BDDE-cross-linked hyaluronic acid (HA) gels were chosen due to their volumizing properties and minimal risk of migration or adverse effects. Specifically, Aliaxin<sup>®</sup> fillers have been selected due to their rheological characteristics, such as the high cohesivity values, long-term duration and good safety profile, which ensures a respectful and natural approach for the patient (23). The injection was performed with a 22G x 50 mm cannula to allow precise placement along the periosteum and muscle layers, minimizing the risk of intravascular injection, which is crucial in the orbital region due to the risk of vascular complications (26). The treatment aimed to improve both the function and appearance of the eye structures following surgery. Aliaxin<sup>®</sup> Superior Volume (A<sub>SV</sub>) was injected via a 22G x 50 mm cannula along the periosteum of the superior orbital frame, entering from the outer canthus. Aliaxin<sup>®</sup> Essential Volume (A<sub>EV</sub>) was injected into the muscle layer, also entering from the outer canthus (Figure 1). A<sub>SV</sub> and A<sub>EV</sub> were selected due to their high molecular weight and cross-linking, which provided the desired volumizing and cohesive properties for soft tissue augmentation. A<sub>SV</sub> restored the structural framework of the orbit, while A<sub>EV</sub> improved the mechanical function of the eyelid through soft tissue support. A total of 1 mL of each product was used, and the entire treatment took 15 minutes.

Before treatment with Aliaxin<sup>®</sup>, the patient presented with upper eyelid retraction due to a lack of orbital fat tissue, upper eyelid ptosis, continuous lacrimation, and redness of the conjunctiva (Figures 2A, B). Clinical improvements were assessed by the investigator post-treatment and during follow-up visits at 1 month and 14 months after injection (Figures 2C, D). Additionally,

patient quality of life and vision were evaluated using the EYE-Q (Effects of Youngsters' Eyesight on Quality of Life) questionnaire at baseline (before treatment) and at the follow-up visits. The EYE-Q questionnaire, designed for children aged 8 and older and young adults (up to 18 years), includes 26 items that assess vision functionality using a 5-point scale: 1 (excellent), 2 (good), 3 (fair), 4 (poor), 5 (very poor), and 6 (blind). It also examines symptoms related to common uveitis (eye redness, blurry vision, eye pain, and photosensitivity) and the patient's feelings about different aspects of daily life (10). Three key scores were calculated: the total vision score (EYE-Q Total), the visual function score (EYE-Q VF), and the vision-related quality of life score (EYE-Q VRQL). At the 1-month follow-up, and more notably at the 14-month follow-up, the patient demonstrated significant improvement in all pre-treatment symptoms. Discomfort was reduced, upper eyelid ptosis improved, and swelling of the lower eyelid decreased (Figure 2D). The ability to close the upper eyelid improved, and the volume and symmetry of the superior orbital frame were restored. These changes enhanced eye hydration, leading to a reduction in conjunctival redness. Both the patient and the investigator reported improvements in vision at 1 month and 14 months post-treatment. Furthermore, the patient reported marked improvements in total vision score, visual functionalities, and vision-related quality of life at each follow-up visit, as measured by the EYE-Q questionnaire (Table 1). The treatment with Aliaxin<sup>®</sup> A<sub>EV</sub> and A<sub>SV</sub> provided both aesthetic and functional benefits.

## Discussion

Dermal fillers provide a non-surgical, minimally invasive option for correcting aesthetic deformities in patients following cancer treatment. A key advantage of HA-based fillers, particularly those cross-linked with BDDE, is their ability to offer long-lasting volumizing effects while maintaining excellent biocompatibility. The elastic properties of BDDE-cross-linked HA gels make them especially suitable for dynamic areas like the eyelids, where both

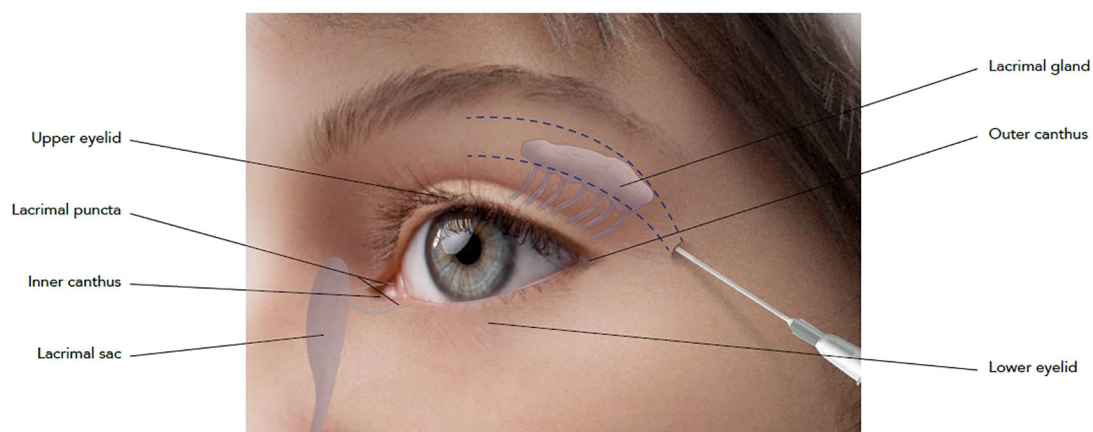


FIGURE 1

Schematic representation of injection technique. Cannula entry-point has been identified at the outer canthus of the eye and injection has been performed using a 22G x 50 mm cannula. A<sub>SV</sub> has been applied on the periosteum of the superior orbital frame, while A<sub>EV</sub> has been injected on the muscle layer.



FIGURE 2

Photographs of the patient: (A, B) before aesthetic treatment; (C) 1-month after treatment with Aliaxin<sup>®</sup> Essential Volume and Aliaxin<sup>®</sup> Superior Volume; (D) 14-months after treatment. Patient provided informed consent for the use of these images for scientific research.

volume and movement are critical for functional outcomes. This case report demonstrates the use of Aliaxin<sup>®</sup> A<sub>EV</sub> and A<sub>SV</sub> dermal fillers to address specific post-surgical sequelae after cancer treatment, improving both the aesthetic and functional aspects of orbital soft tissues and muscles. Notably, there was significant improvement in superior orbital frame volume and restoration of symmetry in the treated eye. This also led to improvements in eyelid ptosis, muscle function, and eye hydration. A<sub>EV</sub> and A<sub>SV</sub> fillers are highly elastic, capable of recreating volume in the upper eyelid with a prolonged effect, without the adverse events typically associated with fillers, such as nodule formation (25–27). Limitations of this case report include the relatively short-period follow-up. Moreover, this kind of approach are also to be considered as temporary, and patient could also require other treatments to improve the aesthetic and functional impairment. An extended follow-up period is therefore required to fully evaluate fillers approaches. However, in this case the treatment remained effective for over a year post-injection. The sustained mechanical improvement in the upper eyelid, coupled with enhanced eye hydration, contributed to a decrease in conjunctival redness and an improvement in vision 14 months after treatment. These changes positively impacted the patient's quality of life.

Although aesthetic treatments can represent an effective and useful approach to ameliorate patients' quality of life and impairments due to post-surgical sequelae due to cancer treatment, there are crucial medico-legal and ethical evaluations to be considered. Although rare, fillers could lead to potential adverse events and complications, such as oedema, bruising, swelling, lumps or nodules, granulomas and inflammatory nodules (27–29). Another potential severe complication is represented by hypersensitivity reactions to dermal fillers; these can be classified into acute, which occurs within minutes to hours after injection, and delayed, which can take place from 24 hours to months after treatment (30). In particular, several articles recently published have also highlighted the overall increase of hypersensitivity reactions associated with fillers after the COVID-19 pandemic (31, 32). These aspects need to be considered and evaluated by healthcare practitioners, especially for the treatment of fragile patients, such as post-cancer ones. Therefore, it is essential that healthcare practitioners possess a full overview of patients' anamnesis and history as well as a deep knowledge of anatomy, injection guidelines and associated risks. It is also fundamental for the patient to receive an informed consent form which is not merely need to obtain a signed consent, but it is focused to provide a complete explanation and understanding of the proposed products, treatments and the associated risks (14).

**TABLE 1** Quality of life and vision functionalities assessed using EYE-Q questionnaire at baseline (before treatment) and 1 and 14 months after treatment.

	Baseline	1 month after treatment	14 months after treatment
EYE-Q Total	3.3	2.1	2.5
EYE-Q VF	3.55	2.75	3.05
EYE-Q VQRL	2.9	2	2.1

EYE-Q, Eyesight on Quality of Life; EYE-Q VF, EYE-Q visual function score; EYE-Q VQRL, EYE-Q vision-related quality of life score.

For this case report, it is essential to highlight that this patient had been in remission for 10 years post-oncological treatment and has been declared tumor-free. Moreover, the patient did not report any adverse events and/or hypersensitivity reaction during the 14 months follow-up period. However, patients with active disease, those still undergoing cancer treatment, or those who are psychologically unstable are not recommended candidates and should not be treated with dermal fillers (2, 33). Physicians must assess each patient's suitability for aesthetic procedures on a case-by-case basis, considering both their physical and emotional well-being in collaboration with a multidisciplinary team (2).

Despite the importance of physical appearance for cancer survivors, there are limited studies investigating the use of dermal fillers in this population (34). One small study explored the use of small gel particle HA with lidocaine dermal filler in combination with abobotulinumtoxinA in post-chemotherapy patients, reporting well-tolerated treatments and significant aesthetic benefits after eight weeks (13). Another study successfully corrected soft tissue loss secondary to facial lymphoma using HA and poly-L-lactic acid (35). While studies in non-cancer patients have consistently reported positive quality of life changes following the use of minimally invasive cosmetic injectables (36, 37), the application of dermal fillers in cancer survivors requires careful consideration.

Though the risk of adverse events such as inflammation or infection is generally low, the long-term safety of dermal fillers in patients with a history of radiation or chemotherapy is not yet fully understood. It is essential to exclude patients with active disease or those undergoing immunosuppressive therapy from treatment, as their ability to heal and manage infections may be compromised (33).

Considering these aspects and the multiple clinical, cultural and ethical challenges of the aesthetic medicine nowadays, it is also crucial to work with a multidisciplinary approach, ensuring the respect of a pertinent ethical conduct for all the patients (38).

A thorough multidisciplinary approach, combined with patient education, ensures that both the physical and emotional needs of cancer survivors are carefully addressed when considering aesthetic interventions.

## Conclusion

To our knowledge, this is the first reported use of dermal fillers to address ocular changes following tumor resection and radiotherapy. Treatment with A<sub>SV</sub> and A<sub>EV</sub> provided both aesthetic and functional

improvements, enhancing the patient's vision and overall quality of life. The successful application of BDDE-cross-linked hyaluronic acid fillers in this case introduces a novel approach to post-oncological rehabilitation. This case highlights the potential of dermal fillers to restore both the aesthetic appearance and functional capacity of the upper eyelid after orbital surgery, showcasing their versatility beyond traditional cosmetic use.

With the growing population of cancer survivors facing long-term complications, minimally invasive treatments like dermal fillers present a promising therapeutic option. However, further research is necessary to validate these findings in larger patient cohorts and to evaluate long-term outcomes, particularly in patients with complex oncological histories. By presenting this case, we aim to encourage the integration of aesthetic treatments into oncological aftercare, where quality of life remains a central concern.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

## Data availability statement

The data presented in this case report are available on request from the corresponding author. The data are not publicly available due to privacy and ethical reasons.

## Ethics statement

This case report was conducted in accordance with the local legislation, institutional requirements and the Declaration of Helsinki. Written informed consent was obtained from the patient for the publication of any potentially identifiable images or data included in this article.

## Author contributions

SE: Conceptualization, Data curation, Writing - review & editing. VV: Data curation, Writing - review & editing. AS: Data curation, Writing - review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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