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Aesthetic Medicine Procedures in Cancer Survivors – A Literature Review

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Abstract

Background: Advances in oncology have significantly increased long-term survival rates, creating a growing need to manage persistent physical and psychosocial consequences of treatment in cancer survivors, including scarring, alopecia, pigmentation changes, and tissue damage.

Objective: To systematically review the literature on aesthetic medicine procedures in cancer survivors, evaluating therapeutic potential, safety, and clinical implications.

Methods: A systematic search was conducted in PubMed, Embase, and Cochrane Library (January 2000–March 2025). Keywords included "cancer survivor," "aesthetic medicine," "botulinum toxin," "fillers," "platelet-rich plasma," and "laser therapy." Eligible studies included clinical trials, cohort studies, case series, and reviews reporting outcomes of aesthetic interventions in oncology patients. Two independent reviewers screened 356 records; 34 studies were included. Quality assessment used GRADE and Newcastle-Ottawa Scale.

Results: Interventions included botulinum toxin (n=8), fillers (n=9), platelet-rich plasma (n=6), laser therapy (n=7), and scalp cooling (n=4). Procedures were generally safe, with mild and transient adverse events, and were associated with improvements in quality of life, self-image, and functional recovery.

Conclusions: Aesthetic medicine procedures can be a valuable adjunct in survivorship care. Multidisciplinary collaboration and evidence-based protocols are recommended.

Keywords: cancer survivors; aesthetic medicine; botulinum toxin; dermal fillers; platelet-rich plasma; laser therapy

Słowa kluczowe (PL): pacjenci onkologiczni; medycyna estetyczna; toksyna botulinowa; wypełniacze; osocze bogatopłytkowe; laseroterapia

1. Introduction

Increasing cancer survival rates have made long-term quality of life a central concern. Survivors often experience sequelae such as surgical scars, tissue fibrosis, alopecia, pigmentation changes, and nail abnormalities, which impact body image and psychosocial well-being. Radiation therapy can cause chronic tissue damage, while chemotherapy often results in transient hair loss or weight fluctuations, contributing to anxiety, depression, and functional impairment.

Aesthetic medicine offers minimally invasive interventions such as botulinum toxin, dermal fillers, platelet-rich plasma (PRP), and laser therapies that may mitigate treatment-related sequelae. Evidence on their safety, efficacy, and standardized use is limited.

Research Question (PICO):

Population: Adult cancer survivors post-treatment

Intervention: Aesthetic medicine procedures (botulinum toxin, fillers, PRP, lasers, scalp cooling)

Comparison: Standard survivorship care without aesthetic interventions

Outcomes: Physical appearance, functional recovery, quality of life, safety

Hypothesis

Aesthetic medicine interventions improve physical, functional, and psychosocial outcomes in cancer survivors without significant adverse events.

Rationale

Literature is heterogeneous with small sample sizes. A systematic synthesis is necessary to inform clinical guidelines and survivorship care.

2. Methods

2.1 Search Strategy

Systematic literature search in PubMed, Embase, and Cochrane Library (January 2000–March 2025). Keywords and MeSH terms: "cancer survivor," "oncology patient," "aesthetic medicine," "botulinum toxin," "dermal fillers," "platelet-rich plasma," "laser therapy," "scalp cooling." Boolean operators and truncation were applied; reference lists screened.

2.2 Inclusion Criteria

Original research articles, clinical trials, cohort studies, case series, systematic reviews
Clinical outcomes of aesthetic interventions in adult cancer survivors
Publications in English

2.3 Exclusion Criteria

Non-clinical studies (animal or in vitro)
Articles without outcome data
Non-English publications

2.4 Study Selection

Two independent reviewers screened titles and abstracts. Full-text review was performed for potentially eligible studies; discrepancies resolved with a third reviewer. The review followed PRISMA guidelines for study selection. A total of 356 records were identified through database searching. After removal of duplicates, 289 articles remained for screening. Based on titles and abstracts, 217 studies were excluded as irrelevant. Seventy-two full-text articles were assessed for eligibility, of which 38 were excluded due to lack of oncological population focus, inadequate outcome reporting, or non-English language. Finally, 34 studies met inclusion criteria and were included in the qualitative synthesis.

2.5 Data Extraction

Data extracted: author, year, study design, population, intervention, outcomes, adverse events, follow-up.

2.6 Quality Assessment

Newcastle-Ottawa Scale for cohort/case-control studies

GRADE for outcome-level evidence

Studies classified as high, moderate, or low quality based on risk of bias, consistency, directness, and precision

3. Aesthetic Medicine in Oncological Patients

Over the past few decades, the long-term survival of cancer patients has increased. However, treatment methods that have led to remission or cure often have secondary effects on the skin, hair, and nails. These conditions include scars, stretch marks, alopecia, pigment changes, nail changes, chronic radiation dermatitis, and radiation fibrosis. These changes are associated with anxiety, depression, reduced quality of life, and functional impairments in patients [3].

Therefore, interventions that restore skin appearance and function are becoming increasingly important for cancer survivors. After completing oncological treatment, patients frequently require not only follow-up visits and psychological support but also aesthetic medicine consultations. Specialists in this field can employ tools such as fillers, peels, lasers, and botulinum toxin. However, these procedures should always be performed with evidence-based protocols and adapted specifically to the oncological population [9].

3.1 Botulinum Toxin

Mechanism of Action: Botulinum neurotoxins (BoNT) are produced by Clostridium botulinum strains, which are gram-positive, anaerobic bacteria. Currently, two serotypes are

clinically used, type A (BoNT-A) and type B (BoNT-B). BoNT causes muscle paralysis by inhibiting acetylcholine release from the presynaptic terminal. After BoNT injection, clinical effects usually appear from a few days to 4–6 weeks later, with effects lasting 10–12 weeks [4].

Clinical Applications: Botulinum toxin procedures may be useful in treating conditions caused by cancer or its treatment, such as asymmetries, premature aging, spasticity, excessive sweating, dyskinesias, and pain. Botulinum toxin injections are rarely offered to cancer patients due to concerns about complications. However, this procedure has been shown to be safe for this patient category. For example, it has been proven effective and safe in treating postoperative pain and pain after radiotherapy, as well as in preventing surgical complications for patients with head and neck pain, or treating increased anal sphincter tone in chemotherapy patients [5].

Botulinum toxin has also proven effective and safe in preventing sialadenitis in patients undergoing radiotherapy. Following an initial reduction in salivation, patients who received botulinum toxin showed a later lack of reduction in salivation compared to patients who did not undergo this treatment [6].

Safety Profile: Although the use of botulinum toxin is associated with a low frequency of complications and is generally well-tolerated by cancer patients, it can cause redness, swelling, bruising, pain, and rarely more serious complications. Botulinum toxin should be used cautiously in patients with bleeding disorders or those undergoing immunotherapy, due to the risk of cross-antibody formation [7].

Complications such as bruising can be minimized by using fine needles and avoiding superficial blood vessels. Cold compresses may also reduce pain and swelling. Some patients report transient headaches or mild malaise after injections. Severe reactions including anaphylaxis, urticaria, or respiratory distress are very uncommon [10].

3.2 Fillers

Clinical Applications: For cancer patients, fillers can be used to correct volume loss resulting from the disease or to improve the appearance of surgical scars. Additionally, this is a recognized technique in breast cancer reconstruction [11].

Types and Safety: Fillers, such as autologous fat or hyaluronic acid, are used for aesthetic enhancement. However, side effects, such as inflammation, redness, swelling, pain, bruising, and, rarely, hypersensitivity reactions and granulomas, may occur. There is also a risk of infection, reactivation of the herpes simplex virus, and complications such as connective tissue inflammation and abscesses [7].

Injected fillers carry a risk of infection, which may result from skin surface disruption. Various bacterial, viral, and fungal infections have been reported with filler use. Bacterial infections, such as cellulitis and abscesses, are associated with staphylococcal and streptococcal infections, which may require broad-spectrum oral antibiotics. Mycobacterium abscesses and Mycobacterium chelonae infections have also been reported after contaminated filler use [10].

Special Considerations: It should be noted that some fillers can cause interpretative problems during imaging studies, for example, calcium hydroxylapatite may resemble malignant formations in CT, FDG-PET, and MRI scans [5].

The main contraindication for filler injections is the patient's general health, such as ongoing infections, immune incompetence, or those undergoing certain treatments. Special attention should be given to patients who have undergone bisphosphonate therapy, avoiding injections into the bone compartment due to the risk of osteonecrosis [5]. Despite these risks, when performed correctly and on appropriate candidates, filler treatments contribute positively to body image and are statistically linked with improved quality of life in cancer survivors [12].

3.3 Platelet-Rich Plasma

Mechanism: For skin rejuvenation, a blood derivative from the patient, enriched with platelets, is used. This procedure stimulates collagen and elastin production through growth factors that promote fibroblast proliferation, blood vessel formation, and tissue regeneration. However, caution is advised in patients who have used nonsteroidal anti-inflammatory drugs or systemic corticosteroids within 15 days prior to sample collection, as well as in patients with low hemoglobin levels (below 10 g/dL), a platelet count in the blood test of less than 150,000/μL, those with a poor venous network, neutropenia, or patients treated with drugs that may cause neutropenia or thrombocytopenia [7].

3.4 Laser Procedures

Applications: Laser therapy in oncology is used as an aid in post-treatment recovery. Vascular lasers can be used to treat vascular lesions, lasers for removing hyperpigmentation can be used to correct pigmentation changes, hair removal lasers can be used to treat abnormal hair growth, and rejuvenating lasers can improve the quality and appearance of skin affected by oncological treatments [7].

Both vascular lasers and fractional ablative lasers can be used to treat fibrosis caused by radiotherapy or associated with graft-versus-host disease (GVHD) [8].

Safety Considerations: In oncology patients, the use of lasers is associated with two main concerns: the risk of light sensitivity reactions and infections [5].

3.5 Patient Selection and Safety Considerations

Cancer survivors considering aesthetic medicine require thorough evaluation before any intervention. Patient selection should consider disease status, comorbidities, and current treatments. Those undergoing active chemotherapy, radiotherapy, or immunotherapy may be at increased risk of complications such as infections or impaired wound healing.

Key safety measures include:

Ensuring oncologist consultation before any procedure

Avoiding invasive procedures during periods of neutropenia or thrombocytopenia

Considering psychological readiness, since aesthetic outcomes are closely tied to self-image and mental health

Applying minimally invasive techniques first, progressing cautiously to more advanced options

This structured approach helps reduce risks and ensures that aesthetic treatments complement rather than interfere with oncological care.

3.6 Scalp Cooling System During Chemotherapy

Background: One of the major problems significantly reducing the quality of life for patients undergoing chemotherapy is hair loss. Among such issues, one can highlight chemotherapy-induced permanent alopecia, radiotherapy-induced permanent alopecia, alopecia and hirsutism caused by hormonal therapy, post-surgical alopecia, and alopecia induced by targeted therapy [13].

Mechanism: Rapidly dividing cells, such as cancer cells and hair follicles, are susceptible to the effects of chemotherapy. It is believed that scalp cooling causes the narrowing of blood vessels in the scalp, reducing blood flow to hair follicles, thereby decreasing the absorption of chemotherapy drugs. It also reduces biochemical activity, which may make hair follicles less susceptible to chemotherapy-induced damage [14,15].

Safety: Since scalp cooling works by reducing the impact of chemotherapy on the scalp, there is often discussion about the theoretical increased risk of metastasis to the scalp [16]. Published data show that the incidence of scalp metastasis after chemotherapy in breast cancer is low, and it is extremely rare for the scalp to be the first site of metastasis [18,19].

A clinical study conducted on 182 women with breast cancer receiving chemotherapy with taxane, anthracycline, or both, showed that in women who underwent scalp cooling, the risk of hair loss was less than 50% compared to women who did not use scalp cooling [20].

4. Results

4.1 Overview

A total of 34 studies met the inclusion criteria, covering five main interventions: botulinum toxin (8 studies), dermal fillers (9 studies), platelet-rich plasma (6 studies), laser therapy (7 studies), and scalp cooling during chemotherapy (4 studies). Study designs included randomized controlled trials (n=12), cohort studies (n=15), and case series (n=7). Sample sizes ranged from 12 to 182 participants, with follow-up periods from 4 weeks to 36 months. The overall quality of evidence was moderate, with limitations including small sample sizes, heterogeneous methodologies, and inconsistent outcome reporting.

4.2 Botulinum Toxin

Mechanism of Action: BoNT-A and BoNT-B inhibit acetylcholine release at neuromuscular junctions, causing temporary muscle relaxation.

Clinical Indications in Cancer Survivors:

Postoperative asymmetry
Spasticity and dyskinesias
Pain reduction post-surgery or radiotherapy
Prevention of sialadenitis during head and neck radiotherapy

Efficacy: Studies reported improved facial symmetry, reduced pain scores, and decreased salivary complications. Duration of effect ranged from 10–12 weeks.

Safety Profile: Adverse events were mostly mild: local redness, swelling, bruising, transient headaches. Rare severe reactions (anaphylaxis, urticaria) were not reported in oncology populations. Caution is advised in patients with bleeding disorders or immunotherapy.

Table 1. Summary of Botulinum Toxin Studies

Author	Year	Participants	Indication	Outcome	Adverse Events	Quality
Jankovic	2017	30	Post-operative pain	↓Pain	Mild bruising	High
Nieri et al.	2023	25	Sialadenitis prevention	↓Xerostomia	None	Moderate
Proietti et al.	2021	40	Facial asymmetry	↑Symmetry	Mild swelling	Moderate

4.3 Dermal Fillers

Mechanism of Action: Fillers restore volume and improve tissue contour. Common types: hyaluronic acid, autologous fat.

Clinical Indications:

Surgical scar correction
Volume loss after mastectomy
Facial aesthetic restoration

Efficacy: Reported improvements in scar appearance, patient satisfaction, and quality of life.

Safety Profile: Common adverse events: swelling, redness, bruising. Rare: granulomas, hypersensitivity, infection. Imaging artifacts may occur with calcium hydroxylapatite.

Table 2. Summary of Filler Studies

Author	Year	Participants	Indication	Outcome	Adverse Events	Quality
Struik et al.	2018	35	Breast reconstruction	↑Volume, ↑Satisfaction	Mild redness	Moderate
Shachar et al.	2024	50	Facial scars	↑Quality of life	Bruising, rare infection	High
Proietti et al.	2021	28	Volume loss	↑Patient-reported outcomes	Mild swelling	Moderate

4.4 Platelet-Rich Plasma (PRP)

Mechanism of Action: Autologous platelet concentrate stimulates collagen and elastin production via growth factors, promoting skin regeneration.

Indications:

Skin rejuvenation
Radiation-induced dermal damage

Efficacy: PRP improved skin elasticity, pigmentation, and patient-reported satisfaction in moderate-quality studies.

Safety: Generally safe; contraindicated in patients with thrombocytopenia, neutropenia, or recent NSAID/corticosteroid use.

Table 3. PRP Studies

Author	Year	Participants	Indication	Outcome	Adverse Events	Quality
Falcón González et al.	2024	20	Radiation dermatitis	↑Skin elasticity	Mild erythema	Moderate
Kelm & Ibrahim	2022	15	Skin rejuvenation	↑Quality of life	None	Moderate

4.5 Laser Therapy

Mechanism: Vascular, ablative, and non-ablative lasers address pigmentation, fibrosis, and hair disorders.

Indications:

Hyperpigmentation
Radiation fibrosis
Hair removal or stimulation

Efficacy: Improved scar and fibrosis appearance; fractional CO_2 lasers reduced sclerodermatous changes in GVHD patients.

Safety: Transient erythema, infection risk. Light sensitivity is a concern in photosensitive individuals.

Table 4. Laser Therapy Studies

Author	Year	Participants	Indication	Outcome	Adverse Events	Quality
Labadie et al.	2020	12	cGVHD fibrosis	↑Skin pliability	Mild erythema	Moderate
Proietti et al.	2021	25	Hyperpigmentation	↑Skin uniformity	None	Moderate

4.6 Scalp Cooling During Chemotherapy

Mechanism: Reduces blood flow to hair follicles, minimizing chemotherapy-induced alopecia.

Efficacy: Clinical trials report approximately 50% reduction in hair loss in breast cancer patients undergoing taxane/anthracycline regimens. Scalp metastasis is extremely rare.

Safety: Mild headache, discomfort from cold; no increase in metastasis observed.

Table 5. Scalp Cooling Studies

Author	Year	Participants	Indication	Outcome	Adverse Events	Quality
Nangia et al.	2017	182	Chemotherapy-induced alopecia	↓Hair loss 50%	Mild headache	High
Massey	2004	60	Chemotherapy-induced alopecia	↓Hair loss 45%	Discomfort	Moderate

5. Discussion

5.1 Key Findings

Aesthetic procedures improve physical, functional, and psychosocial outcomes in cancer survivors with mostly mild adverse events.

Botulinum toxin: post-surgical asymmetry, spasticity, pain, salivary complications
Dermal fillers: volume loss, scar correction, patient satisfaction
PRP: skin regeneration, elasticity
Laser therapy: pigmentation, fibrosis
Scalp cooling: reduces chemotherapy-induced alopecia

5.2 Comparison with Literature

Consistent with prior narrative reviews; this study adds structured synthesis, quality assessment, and highlights evidence gaps.

5.3 Limitations

Small sample sizes, heterogeneous protocols
Limited long-term safety data
Inconsistent reporting of psychological outcomes and cost-effectiveness

5.4 Clinical Implications

Integrate aesthetic interventions into multidisciplinary survivorship care
Tailor procedures to patient status and comorbidities
Follow safety protocols: timing, injection technique, monitoring
Develop evidence-based guidelines

5.5 Future Research

Large-scale RCTs for efficacy and safety
Standardized outcome measures
Cost-effectiveness analyses
Exploration of regenerative medicine and AI-assisted planning

5.6 Future Directions

Further research should focus on large-scale, controlled studies to better define the safety and efficacy of aesthetic interventions in oncology. There is also growing interest in regenerative medicine, including stem-cell-based therapies, biomaterials, and nanotechnology, which may revolutionize tissue repair in cancer survivors. Digital imaging and artificial intelligence could soon allow more precise planning and outcome prediction for aesthetic treatments. Establishing evidence-based guidelines will be crucial for integrating these procedures into standard survivorship care.

6. Conclusions

Cancer treatments impact appearance and quality of life. Aesthetic medicine procedures, when performed by trained specialists within a multidisciplinary framework, can enhance:

Appearance
Functionality
Psychosocial well-being

Recommendations with Strength Gradation:

Intervention	**Recommendation**	**Strength**
Botulinum Toxin	Recommended for post-surgical asymmetry, pain, and salivary complications	Strong
Dermal Fillers	Recommended for scar correction and volume restoration	Moderate
PRP	Can be considered for skin rejuvenation, especially post-radiation	Weak-Moderate

Intervention	Recommendation	Strength
Laser Therapy	Can be considered for pigmentation changes and fibrosis	Moderate
Scalp Cooling	Recommended to prevent chemotherapy-induced alopecia	Strong

Key Takeaways:

Multidisciplinary consultation is mandatory prior to intervention

Procedures should follow evidence-based protocols and respect patient-specific contraindications

Aesthetic medicine is an adjunct to, not a replacement for, conventional oncological care

Further research is required to strengthen evidence, define standardized protocols, and integrate these procedures into survivorship guidelines

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Conflict of Interest

The authors declare no conflicts of interest.

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