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Complications of hyaluronic acid fillers in HIV-positive patients: A narrative review

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ABSTRACT

Background: The introduction of antiretroviral therapy (ART) has improved the survival of people living with HIV, yet facial lipoatrophy remains a visible and stigmatizing complication. Hyaluronic acid (HA) fillers are widely used for volume restoration due to their safety, biocompatibility, and reversibility.

Objectives: This narrative review focuses exclusively on HA fillers in HIV-positive patients, aiming to clarify their complication profile.

Materials and methods: A comprehensive search of PubMed, Scopus, and Google Scholar (2000-2024) identified 120 records. After screening and eligibility assessment, 13 studies were included. Data on study design, population, filler type, complications, and management were extracted and narratively synthesized, with results summarized in tabular form.

Results: Early adverse events, such as swelling and erythema, occurred in 50-80% of patients, and bruising in ~50%. Intermediate complications included nodules in 5-10% and indurations up to 30%, usually resolving with conservative management or hyaluronidase. Delayed infections (2-4%) were most often due to *Staphylococcus epidermidis*, *Propionibacterium acnes*, or atypical mycobacteria and required antibiotics or drainage. Granulomatous reactions and abscesses were rare (<5%) and typically occurred in patients with prior permanent filler exposure. No severe vascular events were reported in HIV-specific cohorts, though such risks remain relevant.

Conclusion: HA fillers are effective and generally safe for treating HIV-associated facial lipoatrophy, with most complications being mild and transient. However, immune dysregulation, low CD4 counts, and prior filler history may predispose to granulomas or infections. This review highlights the need for careful patient selection, meticulous technique, and further prospective research to establish standardized safety guidelines.

Introduction

The introduction of potent antiretroviral therapy (ART) has transformed the clinical course of HIV infection, markedly improved survival rates, and enhanced the quality of life of people living with HIV. With sustained viral suppression and immune reconstitution, HIV infection has become a chronic, manageable condition rather than a terminal illness.[1,2] Nevertheless, metabolic and morphological complications remain significant clinical concerns. One of the most visible and distressing complications is facial lipoatrophy, characterized by progressive loss of subcutaneous fat in the cheeks, temples, and periorbital regions. This condition is particularly

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associated with prolonged exposure to older thymidine analog nucleoside reverse transcriptase inhibitors, which interfere with mitochondrial function and promote adipocyte apoptosis.[3-5] The resulting changes in facial appearance may give patients a prematurely aged or stigmatized look that is often associated with HIV disease, thereby undermining both psychosocial well-being and treatment adherence.

The psychosocial implications of facial lipoatrophy are profound.[6,7] Patients frequently report diminished self-esteem, reluctance to participate in social activities, and fear of disclosure due to the recognizable appearance of HIV-associated facial changes. These challenges can lead to social isolation, depression, and reduced adherence to ART, ultimately compromising treatment outcomes. Restoring facial volume has therefore become an important therapeutic goal, not only to improve appearance but also to enhance quality of life and support long-term adherence to HIV care.

In response to this need, dermal fillers have been introduced as an effective treatment option. Among the available agents, hyaluronic acid (HA) fillers are particularly favored because of their favorable safety profile, biocompatibility, biodegradability, and reversibility with hyaluronidase.[8-10] Compared with permanent fillers such as silicone or polyacrylamide gel, HA fillers are associated with fewer long-term adverse effects and can be safely dissolved if complications arise.[11,12] These characteristics make them especially suitable for use in immunocompromised patients, where safety and reversibility are critical considerations. Clinical studies have consistently demonstrated that HA fillers can restore facial contours, improve patient satisfaction, and yield durable results that may persist for one year or longer.[13-20]

Despite these encouraging outcomes, the literature addressing the complications of HA fillers in HIV-positive patients remains limited.[21,22] Most published studies combine results from heterogeneous filler types or general populations, reducing the specificity of findings for HIV-infected cohorts. Moreover, HIV-positive individuals often exhibit unique clinical characteristics that may influence treatment outcomes, including persistent immune dysregulation, chronic systemic inflammation, long-term ART exposure, history of opportunistic infections, and prior use of permanent fillers.[23-26] These factors may modify both the incidence and the clinical presentation of complications, such as infection, granuloma formation, or delayed hypersensitivity reactions.

Previous reviews on HIV-associated facial lipoatrophy have often grouped hyaluronic acid fillers together with other injectable products such as poly-L-lactic acid, calcium hydroxylapatite, and permanent fillers. While these reviews provided useful overviews, they did not specifically distinguish the safety and complication profiles of HA fillers.[21,22] This distinction is clinically important because HA fillers are biodegradable, reversible with hyaluronidase, and currently among the most widely used filler types in aesthetic and reconstructive practice.[27,28] By focusing exclusively on HA fillers in HIV-positive patients, this review addresses a gap in the literature and aims to provide a clearer understanding of their unique risk and safety considerations.

This is the first narrative review focusing exclusively on HA fillers in HIV-positive patients, distinguishing them from other filler types that carry different risk profiles. This focus is clinically relevant because HA is currently the most widely used and reversible filler in practice, making the clarification of its safety profile in immunocompromised patients particularly important.

A clear understanding of the complication profile of HA fillers in HIV-positive patients is therefore essential. This narrative review seeks to synthesize existing evidence on reported adverse events, associated risk factors, and clinical implications of HA filler use in this population. By consolidating current knowledge, this work aims to support evidence-based decision-making, guide safe and effective clinical practice, and highlight gaps warranting further investigation in future research.

Materials and methods

This study was conducted as a narrative review designed to synthesize and critically appraise the available evidence regarding complications associated with hyaluronic acid (HA) fillers in HIV-positive patients. A narrative review approach was selected because the available evidence is heterogeneous and consists predominantly of observational studies, small prospective cohorts, case series, and case reports, which limits the feasibility of formal quantitative synthesis or meta-analysis. The review followed a structured yet non-systematic approach to provide a comprehensive overview of the published literature while maintaining flexibility to incorporate a wide range of study designs and clinical observations.

A comprehensive literature search was performed using three major electronic databases-PubMed, Scopus, and Google Scholar-from January 2000 to December 2024. These databases were selected for their broad coverage of biomedical research, clinical studies, and systematic reviews. The search strategy combined both Medical Subject Headings (MeSH) and free-text terms, organized into conceptual groups using Boolean operators. Terms referring to the intervention included “hyaluronic acid,” “HA filler*,” and “dermal filler*,” which were linked with OR. HIV-related terms (“HIV” OR “human immunodeficiency virus”) were grouped similarly, as were outcome-related terms such as “complications,” “adverse events,” “granuloma,” and “infection.” These groups were then combined using AND to ensure that each search result contained all major concepts. Boolean operators were applied to maximize sensitivity while maintaining specificity.

Reference lists of eligible studies and relevant review articles were also manually screened to identify additional publications not captured in the electronic database search.

Inclusion criteria required that studies be published in English and specifically evaluate the use of HA fillers in HIV-positive individuals. Eligible designs included randomized controlled trials, prospective or retrospective cohort studies, observational case series, case reports, and systematic reviews. This broad inclusion enabled the synthesis of both quantitative and qualitative data that reflect real-world clinical practice.

Exclusion criteria included studies that exclusively investigated non-HA fillers such as poly-L-lactic acid (PLLA), calcium hydroxylapatite (CaHA), or silicone; studies conducted solely in HIV-negative populations; animal studies; and articles not published in English. Studies in which outcomes could not be attributed specifically to HA fillers were also excluded.

The initial search retrieved 120 records. After removing duplicates and screening titles and abstracts, 35 articles were selected for full-text review. Following the application of inclusion and exclusion criteria, 13 studies were ultimately included in the final synthesis.

Data extraction was performed independently by two reviewers. Extracted variables included study design, sample size, patient demographics, immune status (CD4 count, viral load), type and brand of HA filler, injection techniques, follow-up duration, clinical outcomes, and reported complications. Given that most included studies were observational and involved small sample sizes, a formal risk-of-bias assessment tool (such as ROBINS-I or Cochrane RoB2) was not applied. Instead, the strength and limitations of the available evidence were assessed qualitatively, with attention to study design, consistency of findings, and completeness of outcome reporting.

For data synthesis, reported complications were categorized by timing of onset into early (days to weeks), intermediate (weeks to months), and late (months to years). The findings were synthesized narratively, and key studies were summarized in tabular form to highlight patterns in outcomes and complications. This approach allowed the review to integrate diverse forms of evidence while providing a clinically relevant synthesis tailored to the population of HIV-positive patients undergoing treatment with HA fillers. The study selection process followed a structured approach including identification, screening, eligibility assessment, and final inclusion. A flow diagram illustrating the literature search and study selection process is presented in Figure 1. Although this review was not conducted as a formal systematic review, the selection process was performed systematically to enhance transparency and reproducibility.

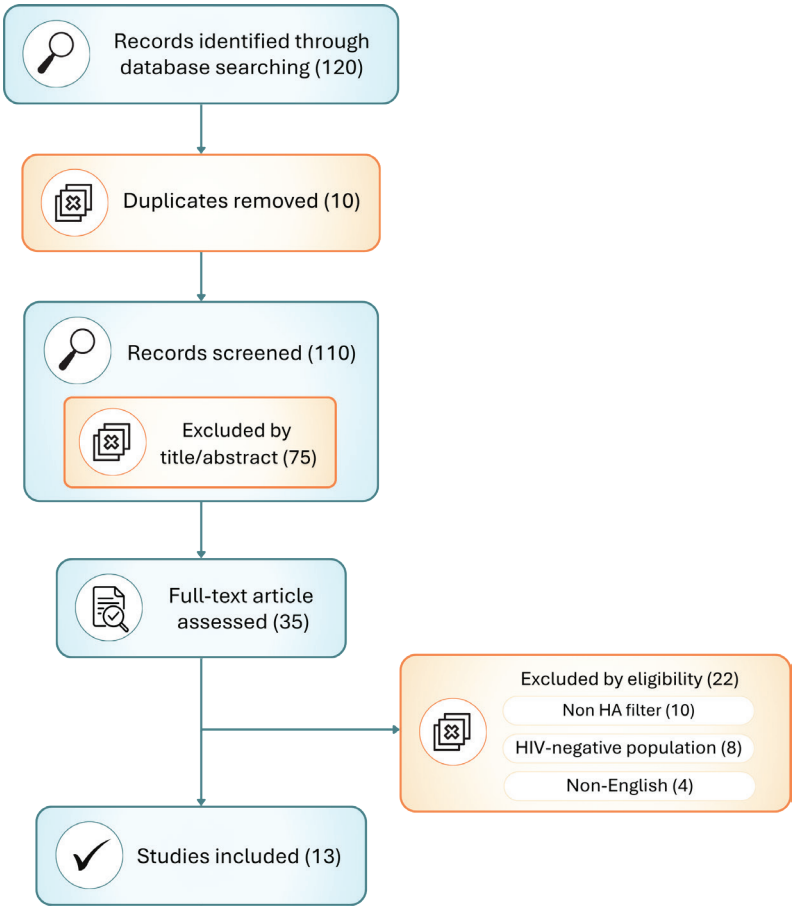


Figure 1. *Flow diagram of the literature search and study selection process.*

Results

Overall safety profile

Thirteen studies met the inclusion criteria, comprising prospective cohort studies, observational studies, case series, and systematic reviews. Across these reports, hyaluronic acid (HA) fillers consistently provided effective correction of HIV-associated facial lipoatrophy, with high levels of patient satisfaction. Most patients maintained improvements for at least 12 months, and some studies demonstrated durability extending to several years. For example, Pünchera *et al*. reported radiologic stability of filler volume for a mean of 7.8 years in a small cohort of four patients.[19] Similarly, Ho and Jagdeo[18] observed significant reductions in Carruthers Lipoatrophy Severity Scale (CLSS) scores from baseline grade 3-4 to grade 1 within 20 HIV-positive patients, with 95% rating their outcomes as "much improved" or "very much improved". [19] These findings establish HA fillers as both efficacious and durable in this population, while underscoring the importance of understanding their complication profile.

Early complications

The most common adverse events were early, transient, and mild, typically occurring within the first few days after injection. Ho and Jagdeo reported transient swelling in 16 of 20 patients (80%) and bruising in 10 of 20 (50%), all of which resolved spontaneously within 1-2 weeks.[19] Becker *et al*. documented mild erythema in 2 of 10 patients (20%), again with spontaneous resolution.[17] Similar findings were described in other cohorts, including Skeie *et al*.,[15] Denton and Tsaparas,[14] and Bechara *et al*., where local swelling, ecchymosis, and tenderness were frequent but self-limited.[29] Overall, across the included studies, early events such as erythema, ecchymosis, tenderness, and swelling were observed in 50-80% of patients but were short-lived and did not require intervention.

Intermediate complications

Intermediate complications, appearing weeks to months post-injection, were more variable but clinically important. Palpable nodules were among the most frequent issues, reported in 2 of 20 patients (10%) in the Ho and Jagdeo[18] cohort and in 3 of 10 patients (30%) in Becker *et al*.[17] Most nodules improved with conservative management, though a minority required hyaluronidase or corticosteroid injection.[11,12] Migration of filler material was radiologically identified in the study by Mundada *et al*., which demonstrated cases of misplacement or migration using MRI and PET-CT; while the exact frequency was not quantified, it was described as an occasional finding on imaging follow-up.[31] Delayed hypersensitivity reactions, presenting as swelling and erythema weeks after injection, were described in fewer than 5% of patients across cohorts, supporting the view that these immune-mediated responses are rare but relevant in HIV-positive individuals with chronic immune activation.[30,31]

Late complications

Late complications, although less common, were clinically more concerning. Granulomatous reactions have been documented in several reports and are estimated to occur in fewer than 5% of treated patients.[29,30,32] In a larger observational study by Pignatti *et al*. delayed inflammatory nodules were observed in approximately 2 of 54 patients (3.7%).[17] Delayed bacterial infections were also noted, typically presenting as abscesses or draining sinuses. Pathogens included *Staphylococcus epidermidis*, *Propionibacterium acnes*, and atypical nontuberculous mycobacteria.[16,33] The estimated frequency of infectious complications ranged from 2-3% across studies. Abscess formation was radiologically confirmed in case reports and was often difficult to treat due to potential biofilms within the filler matrix, necessitating combined antibiotic therapy and hyaluronidase or surgical evacuation. [31,34]

Severe and rare complications

Severe vascular complications were exceedingly rare in HIV-specific cohorts, with no prospective studies directly reporting events such as blindness or tissue necrosis. However, reviews in broader populations have estimated vascular occlusion to occur in approximately 1 in 6,000 to 1 in 10,000 filler injections, rates that remain clinically relevant for HIV-positive patients undergoing treatment in high-risk anatomical zones such as the glabella or nasolabial folds.[12,31,34] While none of the included HIV-focused studies documented such catastrophic events, the literature underscores the need for clinician preparedness and immediate intervention if they occur.[11,34]

Risk factors for complications

Several risk factors for complications were identified. Low CD4 counts (<200 cells/mm^3) and detectable viral loads were associated with higher rates of delayed infections and inflammatory reactions.[35-37] Patients with a history of permanent filler use, particularly silicone or polyacrylamide gel, demonstrated increased susceptibility to granulomatous reactions after subsequent HA filler injections.[27,28,38] Technical factors, including superficial placement and excessive filler volume, contributed to the development of palpable nodules in up to 30% of patients across small cohorts. [17,34] The immunological milieu of HIV, characterized by chronic inflammation and altered T-cell regulation, may further predispose to delayed hypersensitivity and biofilm-related infections,[23-26,30,31] although precise rates remain difficult to quantify due to limited sample sizes.

Clinical implications

Taken together, the findings demonstrate that

most HIV-positive patients treated with HA fillers experience only mild and transient adverse events, such as swelling or bruising, occurring in over half of cases but resolving spontaneously.[14,15,17,18] More clinically significant complications, including nodules and delayed infections, were reported in 5-10% of patients,[16,21,33] while granulomas and biofilm-associated abscesses occurred in fewer than 5%.[29-32] Severe vascular events remain rare but must be anticipated.[12,34] These data highlight the importance of careful patient selection, with preference for those with well-controlled HIV,[35-37] as well as meticulous injection technique and readiness to manage complications with hyaluronidase, corticosteroids, or antibiotics when needed.[11,31,34]

Discussion

The present review confirms that hyaluronic acid (HA) fillers are effective in correcting HIV-associated facial lipoatrophy and are generally well tolerated.[13,15-18] Early complications such as swelling, erythema, and bruising were frequent but minor and self-limiting.[14,15,17,18,29] More clinically relevant events included nodules,[16-18] indurations, granulomas,[29,30,32] and delayed infections.[16,21] These complications, although less common, carry particular importance in HIV-positive patients. The pathophysiological background of HIV may partly explain this pattern. Chronic immune activation, imbalance of T-cell subsets, and altered cytokine signaling can predispose to exaggerated foreign-body reactions, thereby increasing the risk of granulomatous inflammation.[23,24,37] In addition, impaired macrophage and neutrophil function in HIV infection may reduce clearance of bacterial biofilms,[25,26,31] providing a niche for persistent low-grade infections after filler injection. These findings suggest that complication profiles in HIV-positive patients are not solely determined by filler properties but are also influenced by host-related immunological factors. To synthesize the interaction between patient-related and procedure-related determinants of complications in this population, a conceptual framework is shown in Figure 2.

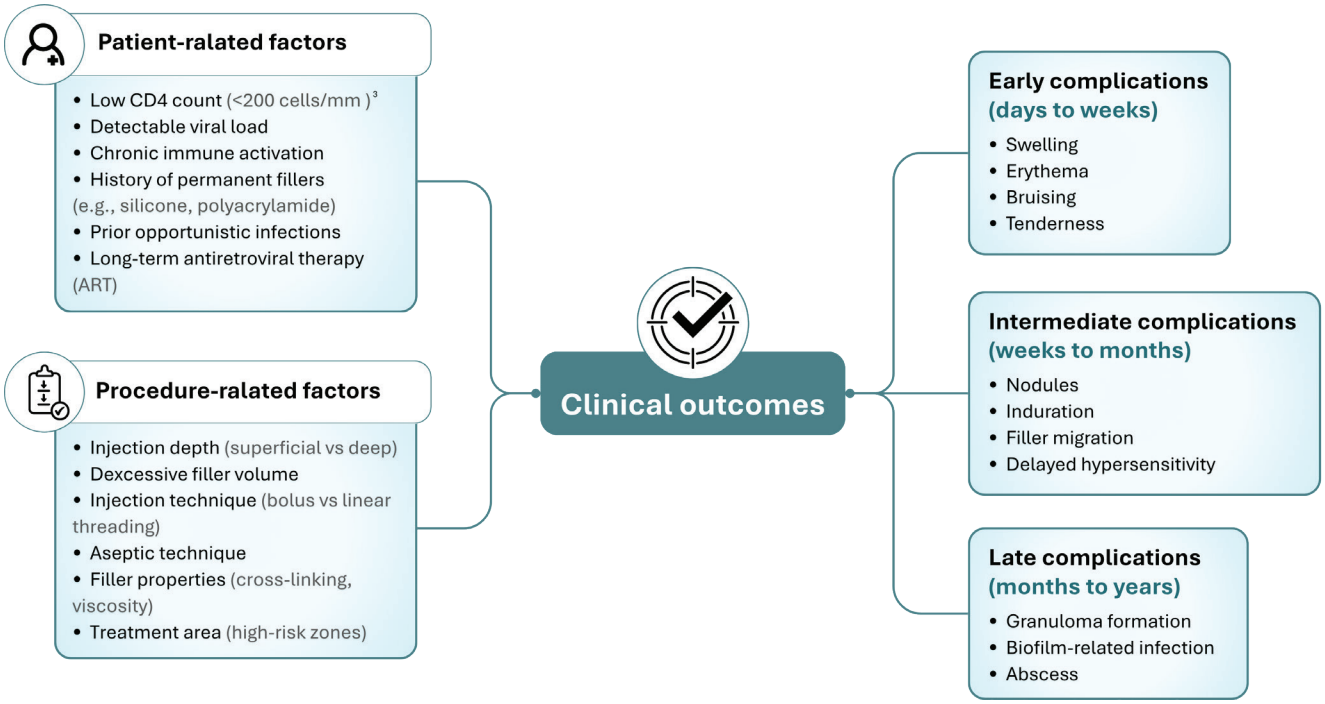


Figure 2. *Conceptual framework of complications associated with hyaluronic acid fillers in HIV-positive patients. Patient-related and procedure-related factors interact to influence the development of early, intermediate, and late complications following HA filler treatment in HIV-positive individuals.*

Comparison with the General Population

When compared with HIV-negative individuals, the overall pattern of complications appears broadly similar.[21,22] However, delayed infections, including those caused by atypical organisms such as nontuberculous mycobacteria, were more frequently reported in HIV-positive patients.[16,32,33] This difference can be understood considering the chronic immunosuppression and altered innate immune responses that characterize HIV infection.[23-25] Granulomatous responses also appeared more common in patients with a history of permanent filler use, suggesting that repeated antigenic stimulation in the context of immune dysregulation may increase the likelihood of foreign-body reactions.[27-29] Severe vascular complications, such as occlusion and necrosis, remain rare but must always be anticipated, since these are largely related to injection technique rather than host immune status.[11,31,34] Importantly, variability in reported complication rates across studies was substantial. While early adverse events

were consistently documented, intermediate and late complications showed greater heterogeneity. This variation may reflect differences in study design, injection techniques, filler types, follow-up duration, and patient characteristics, rather than true differences in complication risk alone. As such, direct comparison across studies should be interpreted with caution.

Quality assessment of included studies

The overall quality of the included evidence was limited. Most studies consisted of small observational cohorts, case series, or case reports, with very few prospective designs and no randomized controlled trials specifically conducted in HIV-positive populations. Sample sizes were generally small, often involving fewer than 20 patients, and follow-up durations varied considerably, thereby limiting the ability to adequately capture delayed or long-term complications.

In addition, there was marked heterogeneity in study design, outcome definitions, and reporting of complications. Standardized criteria for defining and grading adverse events were rarely applied, and clinically relevant immune parameters, such as CD4 count and viral load, were inconsistently reported across studies. This lack of uniformity limits the ability to draw robust comparisons and to evaluate the relationship between immune status and complication risk.

Furthermore, several potential sources of bias should be considered. Selection bias is likely, as many studies included carefully selected patients with well-controlled HIV, which may underestimate complication rates in broader clinical populations. Reporting bias may also be present, particularly in observational studies and case series, where adverse events may be underreported or inconsistently documented.

Taken together, these methodological limitations substantially weaken the overall strength of the evidence and restrict the generalizability of the findings. Consequently, the conclusions of this review should be interpreted with appropriate caution.

Limitations

The available evidence should therefore be interpreted with caution. The conclusions of this review are constrained by the limited scope of available studies. Most were small, observational, or case-based, with heterogeneous methods and outcome measures.[21,22] Sample sizes rarely exceeded 20 patients, and follow-up durations varied widely.[15,17,18,32] Very few studies directly compared HIV-positive and HIV-negative cohorts,[20,21] and stratification by immune markers such as CD4 count or viral load was inconsistently reported. [16,29,39] Without immune stratification, it remains difficult to determine whether complications are driven primarily by filler properties, technical aspects, or the immunologic environment of HIV infection.

Future directions

Future research should aim to clarify mechanistic links by prospectively evaluating complication rates according to immune parameters, including CD4 count, viral suppression, and markers of chronic inflammation.[23,26,37] Comparative trials with alternative interventions, such as poly-L-lactic acid or autologous fat grafting, could help define relative risk profiles.[20,22,40] Longer-term follow-up will be essential to capture delayed events such as granulomas or biofilm-related infections. Finally, multicenter registries that integrate clinical and immunological data would help generate real-world evidence and provide a stronger foundation for evidence-based guidelines.

Conclusion

This narrative review highlights that hyaluronic acid (HA) fillers are an effective and generally safe treatment for HIV-associated facial lipoatrophy. Across clinical studies, patients consistently experienced restoration of facial volume, improved aesthetic outcomes, and enhanced quality of life. Most complications were mild and transient, including swelling, erythema, and bruising. Nevertheless, intermediate and late complications—such as palpable nodules, granulomatous reactions, and delayed infections—were also reported. These events, although relatively uncommon, are clinically relevant given the immune dysregulation and chronic inflammation associated with HIV. Rare but severe complications, including vascular occlusion and tissue necrosis, underscore the importance of expert technique and prompt recognition.

Several risk factors were identified, including low CD4 counts, detectable viral load, prior use of permanent fillers, and technical errors such as superficial placement or excessive injection volume. These findings reinforce the need for careful patient evaluation, strict aseptic technique, and individualized treatment planning.

Overall, HA fillers remain a valuable therapeutic option for HIV-positive patients, offering both aesthetic and psychosocial benefits. However, the evidence base remains limited by small sample sizes and heterogeneous study designs. Larger, prospective studies with standardized methodologies are required to establish clear risk stratification and long-term safety guidelines.

Ethical approval

Not applicable as this article is a narrative review.

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Conflict of interest

The author declares no conflict of interest.

CRediT authorship contribution statement

Kaewkan Thasana-Ekachit: conceptualization, methodology, investigation, data curation, formal analysis, visualization, writing: original draft, **Arisa Kaewkes**: conceptualization, validation, supervision, writing: review and edit.

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