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Autologous Fat Grafting versus Hyaluronic Acid Fillers for Cheek Augmentation: A Prospective Cohort Study Comparing Outcomes and Considerations

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ABSTRACT

Introduction:
Cheek augmentation is a popular aesthetic procedure, with autologous fat grafting (lipofilling) and hyaluronic acid (HA) fillers being the most common techniques. This study aimed to compare the clinical efficacy, complication rates, and psychological impact of lipofilling versus HA fillers for cheek augmentation.

Materials and Methods:
A prospective cohort study was conducted from August 2024 until August 2025 at the University of Sulaimani and one private clinics in Iraq. Forty adult women seeking elective cheek augmentation were enrolled and allocated to either lipofilling (n=20) or HA filler (n=20) groups. Outcomes were assessed using the FACE-Q Satisfaction with Cheeks module, Global Aesthetic Improvement Scale, Derriford Appearance Scale-24 (DAS-24), and standardized photography at multiple timepoints up to 12 months. Complications and psychological effects were systematically recorded.

Results:
The mean age was 32.25 ± 4.40 years (filler) and 36.55 ± 4.58 years (lipofilling). Satisfaction was high in both groups, with 100% of lipofilling and 85% of filler patients "very satisfied" with cheek appearance. Complications were more frequent in the lipofilling group (asymmetry 10%, swelling 55%, donor site bruising 15%) compared to the filler group (bruising 50%, p≤0.001). Lipofilling showed higher evenness satisfaction (75% vs. 35%, p=0.025) and better DAS-24 scores, indicating improved psychological adaptation.

Conclusion:
Both lipofilling and HA fillers are effective for cheek augmentation, with lipofilling offering more natural and even results but a higher minor complication rate. Individualized treatment selection is recommended.

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Introduction

Facial appearance is a key aspect of personal identity and social communication, with the midface, especially the cheeks, playing a central role in perceived youthfulness and attractiveness (1). Aging leads to complex changes in facial anatomy, including bone resorption, fat redistribution, and skin laxity, which together result in volume loss, sagging, and altered facial contours (2). The process of facial aging involves not only bone remodeling but also the atrophy and descent of deep fat compartments, weakening of retaining ligaments, and loss of skin (1). In the cheeks, these changes manifest as hollowing, flattening of the midface, and deepening of nasolabial folds, which can significantly impact self-perception and social interactions (3). These age-related transformations have increased demand for minimally invasive procedures that restore midface volume and rejuvenate facial appearance (1).

Lipofilling, or autologous fat grafting, is a technique that uses the patient's own adipose tissue to restore facial volume. The procedure involves harvesting, processing, and reinjecting fat, offering advantages such as biocompatibility, natural integration, and potential long-term results (4). However, it is not without risks, including fat necrosis, infection, and rare but serious complications like fat embolism, which require careful technique and patient selection (5). Hyaluronic acid (HA) fillers are synthetic, biocompatible injectables widely used for midface augmentation. They provide predictable, immediate results and are generally well tolerated, with effects lasting up to two years (6). Nevertheless, HA fillers can cause complications such as vascular occlusion, granuloma formation, and delayed hypersensitivity reactions, particularly in high-risk facial areas (7). Despite the popularity of both treatments, direct comparative studies focusing on their outcomes, safety, and patient satisfaction in the cheeks are scarce. The necessity and novelty of this study lie in its direct, side by side comparison of lipofilling and HA fillers specifically for cheek augmentation. Therefore, the present study aimed to comparative analysis of the outcomes and considerations of lipofilling and HA in the cheeks.

Methods and Materials

Study design and setting

This prospective comparative cohort study was conducted over a 12-month period, from August 2024 until August 2025, at the College of Medicine, University of Sulaimani, Kurdistan Region, Iraq, in collaboration with one accredited private plastic surgery clinics in Sulaimani city.

Participants

Eligible participants were adults over 18 years of age seeking elective cheek augmentation for aesthetic purposes. Recruitment was carried out through outpatient consultations at the participating private clinic, where potential candidates were informed of the study objectives, procedures, and follow-up requirements. Following initial screening, participants were assigned to one of two intervention groups based on personal preference and clinical suitability: Group A (lipofilling) or Group B (HA fillers). The study was designed as a non-randomized prospective cohort. A total of 40 participants were enrolled, with 20 in each group. The sample size was determined according to feasibility considerations and the capacity for longitudinal follow-up during the study period. Convenience sampling was employed, with consecutive patients presenting for cheek augmentation at the participating clinics invited to enroll. Inclusion criteria comprised adults (>18 years) desiring cheek augmentation with either lipofilling or HA fillers, absence of significant comorbidities (such as uncontrolled diabetes or autoimmune disorders), provision of informed consent, and no prior surgical interventions in the midface region within the preceding five years. Exclusion criteria included a history of hypersensitivity to HA fillers (for Group B), active smoking or substance abuse that could impair wound healing, psychological conditions affecting decision-making capacity (as assessed by the Derriford Appearance Scale-24), and pregnancy or lactation. These criteria ensured the selection of a homogenous and ethically appropriate study population.

Data Collection

Data collection was structured into pre-procedural, intraoperative, and post-procedural phases to ensure comprehensive capture of clinical, technical, and patient centered outcomes. Baseline demographic data, medical history, and aesthetic goals were recorded using standardized intake forms.

The FACE-Q Satisfaction with Cheeks module was administered to quantify patient-reported outcomes, while psychological screening ensured appropriate patient selection. Lipofilling Technique: In the lipofilling group, autologous fat was harvested under local anesthesia (1% lidocaine with 1:100,000 epinephrine) from donor sites, typically the abdomen or thighs, using a 3-mm blunt-tip cannula attached to a 10-mL Luer Lok syringe with manual negative pressure (Coleman technique). Approximately 60–80 mL of lipoaspirate was obtained per patient. The aspirated fat was processed by centrifugation at 1200 rpm for 3 minutes (Hettich Rotina 380R) to separate the oil, aqueous, and adipose layers.

The purified adipose fraction (20–30 mL) was transferred into 1-mL syringes fitted with 17 gauge blunt tip microcannulas (Tulip Medical, San Diego, CA, USA). Fat was injected into the cheeks using a retrograde linear threading technique across three anatomical planes: (1) the deep supraperiosteal plane over the malar eminence and zygomatic arch, (2) the sub SMAS plane in the medial and lateral cheek compartments, and (3) the subdermal plane for fine contouring. A total of 5–8 mL was injected per cheek, evenly distributed across planes to optimize graft survival and minimize contour irregularities.

HA Filler Technique: In the HA filler group, Restylane® Lyft with Lidocaine (Galderma, Fort Worth, TX, USA; NDC 0026-0002-01), a highly cross linked 20 mg/mL hyaluronic acid gel, was used in all cases. Injections were performed under topical anesthesia (4% lidocaine cream) using a 25G, 38-mm atraumatic cannula (TSK Laboratory, Tochigi, Japan). Injection points followed the ATP (Anatomy, Techniques, Products) protocol: (1) a deep bolus at the malar eminence (0.5–1.0 mL per side), (2) linear threading along the zygomatic arch (0.3–0.5 mL per side), and (3) fanning in the medial and lateral cheek compartments (0.2–0.3 mL per thread). The total injection volume per cheek ranged from 1.5–3.0 mL, adjusted according to individual anatomy and aesthetic goals. All procedures were performed by a single board certified plastic surgeon (NOR) with over 10 years of experience in facial volumization.

Follow up assessments were conducted at 1 week, 1 month, 3 months, 6 months, 9 months, and 12 months post-procedure. Standardized photography was performed at each timepoint using a Samsung Galaxy S23 Ultra smartphone under controlled lighting conditions, capturing frontal, oblique, and lateral views.

Primary outcome measures included volume retention and patient satisfaction, while secondary outcomes encompassed complication rates, need for retreatment, and cost-effectiveness. Adverse events such as infection, nodularity, asymmetry, and vascular complications were systematically documented.

Ethical Considerations

Ethical approval for this study was obtained from the Ethics Committee of the University of Sulaimani, College of Medicine, the Ministry of Health, and the ethics committees of the participating clinics (Approval No. REC-2024-08-007). The study adhered to the principles of the Declaration of Helsinki, ensuring voluntary participation, informed consent, and confidentiality.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize demographic and clinical characteristics. Categorical variables were compared using the Fisher's exact test or Chi-square test, as appropriate. Continuous variables were analyzed using independent t-tests or Mann-Whitney U tests, depending on data distribution.

A p-value of <0.05 was considered statistically significant. Results were presented as means ± standard deviations for continuous variables and as frequencies and percentages for categorical variables.

Results

The mean age of women in the Filler group was 32.25 ± 4.399 years, while the mean age

in the Lipofilling group was 36.55 ± 4.582 years. Analysis of educational attainment in the Filler group revealed that 14 (70%) held a Bachelor's degree, three (15%) had completed elementary education, two (10%) had a high school diploma, and one (5%) had graduated from a technical institute. In the Lipofilling group, six (30%) had a Bachelor's degree, two (10%) had a Board degree, three (15%) had completed elementary education, five (25%) had a high school diploma, and four (20%) had graduated from a technical institute. In terms of marital status, 10 (50%) of the Filler group and 19 (95%) of the Lipofilling group were married. All participants in both groups had a negative medical history (Table 1).

Table 1. Sociodemographic Characteristics in two group participations

Characteristics		Group	
		Filler group (n=20)	Lipofilling group (n=20)
Age		32.25 ± 4.399	36.55 ± 4.582
Educational level	Bachelor's	14 (70%)	6 (30%)
	Board	0	2 (10%)
	Elementary	3 (15%)	3 (15%)
	High school diploma	2 (10%)	5 (25%)
	Technical institute	1 (5%)	4 (20%)
Marital status	Married	10 (50%)	19 (95%)
	Single	10 (50%)	1 (5%)
Medical history	Positive	0	0
	Negative	2 (100%)	20 (100%)

The donor site for fat harvesting in the Lipofilling group was the abdomen in 14 (70%) women and the thighs in six (30%) women (Figure 1).

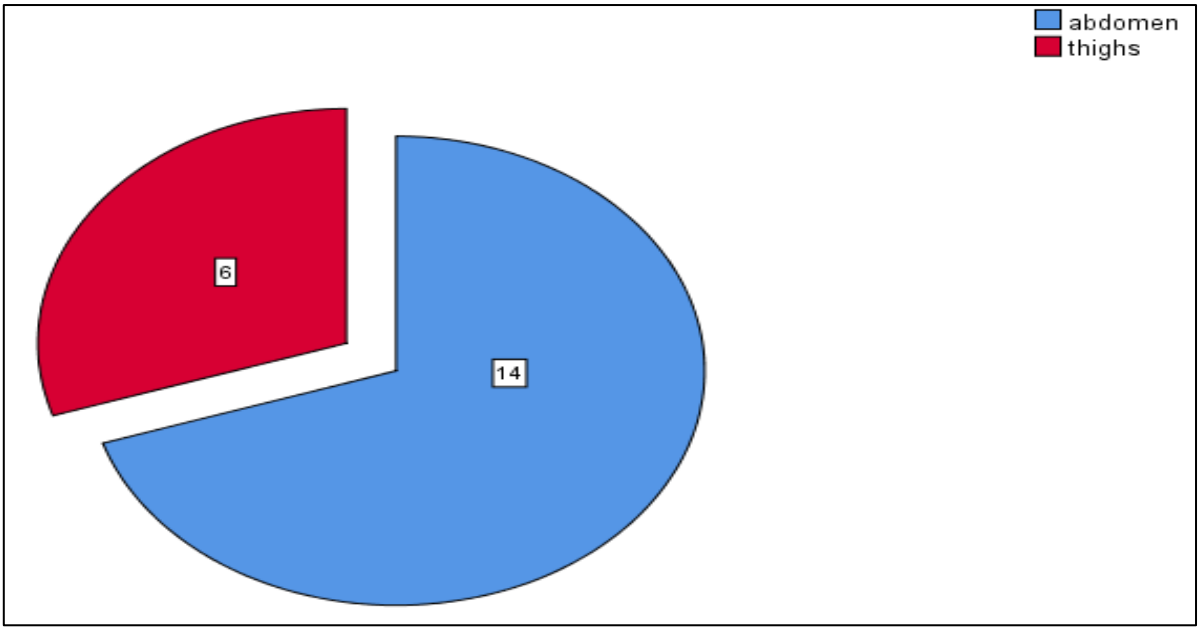

Figure 1. Fat donor site in female Lipofilling group

Regarding the volume of filler injected in the Filler group, eight (40%) women received 1.5 cc per cheek, 10 (50%) received 2 cc per cheek, and two (10%) received 3 cc per cheek. All participants in this group received a highly cross-linked HA filler (Figure 2).

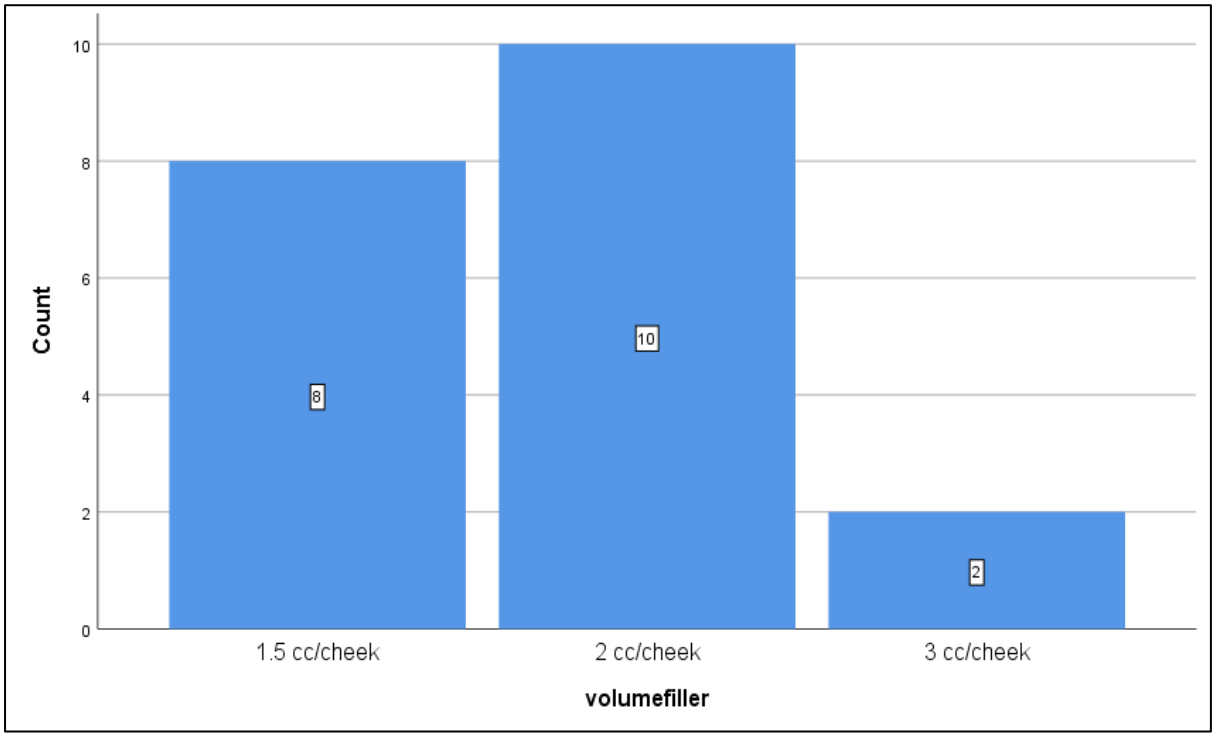

Figure 2. Volume filler injection in female Filler group

Complications associated with Filler and Lipofilling procedures are presented in Table 2. In the Filler group, bruising was observed in 10 (50%) women, while the remaining 10 (50%) experienced no complications. In the Lipofilling group, complications included asymmetry in two (10%), bruising in three (15%), donor site bruising in three (15%), nodule formation in the right cheek in one (5%), and swelling in 11 (55%) women. There was a statistically significant relationship in the incidence of complications between the two groups (P≤0.001).

Table 2. Comparison of complications among women in the two groups

Characteristics		Group		P-value*
		Filler group (n=20)	Lipofilling group (n=20)	
Complications	asymmetry	0	2 (10%)	0.001
	bruising	10 (50%)	3 (15%)	
	Donor site bruising	0	3 (15%)	
	Nodule, right cheek	0	1 (5%)	
	Swelling	0	11 (5%)	
	None	10 (50%)	0	
*P-value based on fisher exact test				

Table 3 presents the levels of satisfaction regarding various aspects of cheek appearance among participants in the filler group (n=20) and the lipofilling group (n=20). Across most categories, both groups reported high satisfaction, with the majority indicating they were "very satisfied." Notably, 20 participants (100%) in the lipofilling group and 17 (85%) in the filler group were "very satisfied" with the overall appearance of their cheeks. Similarly, for the perception of youthfulness and naturalness, all participants in the lipofilling group (20, 100%) and nearly all in the filler group (19, 95% for youthfulness; 20, 100% for naturalness) expressed being "very satisfied." The most statistically significant difference was observed in the evenness of the cheeks (p=0.025), where 15 (75%) in the lipofilling group were "very satisfied" compared to 7 (35%) in the filler group.

Table 3. Level of satisfaction of cheeks in the two participating groups.

Characteristics		Group		P-value
		Filler group (n=20)	Lipofilling group (n=20)	
The overall appearance of my cheeks	Very dissatisfied	0	0	0.231
	Dissatisfied	0	0	
	Natural	0	0	
	Satisfied	3 (15%)	0	
	Very satisfied	17 (85%)	20 (100%)	
The fullness/volume of my cheeks	Very dissatisfied	0	0	0.731
	Dissatisfied	0	0	
	Natural	0	1 (5%)	
	Satisfied	7 (35%)	5 (25%)	
	Very satisfied	13 (65%)	14 (70%)	
How even my cheeks look	Very dissatisfied	0	0	0.025
	Dissatisfied	0	0	
	Natural	0	0	
	Satisfied	13 (60%)	5 (25%)	
	Very satisfied	7 (35%)	15 (75%)	
How youthful my cheeks look	Very dissatisfied	0	0	N/S
	Dissatisfied	0	0	
	Natural	0	0	
	Satisfied	1 (5%)	0	
	Very satisfied	19 (95%)	20 (100%)	
How natural my cheeks look	Very dissatisfied	0	0	N/S
	Dissatisfied	0	0	
	Natural	0	0	
	Satisfied	0	0	
	Very satisfied	20 (100%)	20 (1005)	
The symmetry of my cheeks	Very dissatisfied	0	0	0.176
	Dissatisfied	0	0	
	Natural	0	1 (5%)	
	Satisfied	9 (45%)	4 (20%)	
	Very satisfied	11 (55%)	15 (75%)	
How my cheeks look when I smile or talk	Very dissatisfied	0	0	0.106
	Dissatisfied	0	0	
	Natural	0	0	
	Satisfied	4 (20%)	0	
	Very satisfied	16 (80%)	20 (100%)	
*P-value based on fisher exact test				

Based on the Global Aesthetic Improvement Scale, in the Filler group, 14 women (70%) were rated as "very much improved," while six women (30%) were rated as "much improved." In the Lipofilling group, 18 women (90%) were classified as "very much improved," and two women (10%) as "much improved" (Table 3).

Table 4. Comparison Global Aesthetic Improvement Scale in the two groups

Characteristics		Group		P-value*
		Filler group (n=20)	Lipofilling group (n=20)	
Global Aesthetic Improvement Scale	Very much improved	14 (70%)	18 (90%)	0.235
	Much improved	6 (30%)	2 (10%)	
	Improved	0	0	
	No change	0	0	
	Worse	0	0	
*P-value based on fisher exact test				

The psychological impact in both groups is also shown in Table 5. Regarding increased self-confidence about their appearance, in the Filler group, six women (30%) "agreed" and 14 women (70%) "strongly agreed." In the Lipofilling group, five women (25%) "agreed" and 15 women (75%) "strongly agreed." Regarding feeling more comfortable in social situations, in the Filler group, eight women (40%) "agreed" and 12 women (60%) "strongly agreed." In the Lipofilling group, six women (30%) "agreed" and 16 women (70%) "strongly agreed." In terms of meeting expectations from the procedure, in the Filler group, four women (20%) "agreed" and 16 women (80%) "strongly agreed." In the Lipofilling group, two women (10%) "agreed" and 18 women (90%) "strongly agreed." Regarding the likelihood of recommending the procedure to others, all women in the Filler group 20 (100%) "strongly agreed." In the Lipofilling group, one woman (5%) "agreed" and 19 women (95%) "strongly agreed."

Table 5. Psychological Impact in the two participating groups.

Characteristics		Group		P-value
		Filler group (n=20)	Lipofilling group (n=20)	
I feel more confident in my appearance since the procedure	Strongly disagree	0	0	N/S
	Disagree	0	0	
	Natural	0	0	
	Agree	6 (30%)	5 (25%)	
	Strongly agree	14 (70%)	15 (75%)	
I feel more comfortable in social situations	Strongly disagree	0	0	0.741
	Disagree	0	0	
	Natural	0	0	
	Agree	8 (40%)	6 (30%)	
	Strongly agree	12 (60%)	14 (70%)	
I feel that the procedure met my expectations	Strongly disagree	0	0	0.661
	Disagree	0	0	
	Natural	0	0	
	Agree	4 (20%)	2 (10%)	
	Strongly agree	16 (80%)	18 (90%)	
I would recommend this procedure to others	Strongly disagree	0	0	N/S
	Disagree	0	0	
	Natural	0	0	
	Agree	0	1 (5%)	
	Strongly agree	20 (100%)	19 (95%)	
***P-value based on fisher exact test**				

An analysis of the DAS-24 scores between two participant groups revealed that individuals who underwent lipofilling generally demonstrated a more favorable and desirable appearance-related status and exhibited improved adaptation to environmental conditions. These findings suggest that lipofilling contributes positively to various aspects of quality of life related to appearance (Table 6).

Table 6. Psychological Impact in the two participating groups

Derriford Appearance Scale (DAS-24) items	Filler group (n=20)		Lipofilling group (n=20)	
	Significant problem on DAS-24	Frequency (Percent) DAS-24	Significant problem on DAS-24	Frequency (Percent) DAS-24
How confident do you feel	Moderately	9 (45%)	Not at all	1 (\5%)
How distressed do you get when you see yourself in the mirror/ window	Moderately	8 (40%)	Not at all	2 (10%)
My self-consciousness makes me feel irritable at home	Not at all	7 (35%)	Not at all	2 (10%)
How hurt do you feel	Moderately	10 (50%)	Not at all	1 (5%)
At present, my self-consciousness has an adverse effect on my work	Moderately	8 (40%)	Slightly	3 (15%)
How distressed do you get when you go to the beach	Moderately	9 (45%)	Slightly	3 (15%)
Other people misjudge me because of my feature	Slightly	5 (25%)	Not at all	1 (5%)
How feminine/masculine do you feel	Slightly	2 (20%)	Not at all	0
I am self-conscious of my feature	Moderately	8 (40%)	Extremely	20 (100%)
How irritable do you feel	Moderately	7 (35%)	Slightly	3 (15%)
I adopt certain gestures (e.g., folding my arms in front of other people, covering my mouth with my hand)	Moderately	6 (30%)	Slightly	3 (15%)
I avoid communal changing rooms	Extremely	20 (100%)	Moderately	7 (35%)
How distressed do you get by shopping in department stores/ supermarkets	Moderately	6 (30%)	Moderately	4 (20%)
How rejected do you feel	Not at all	-	Not at all	--
I avoid undressing in front of my partner	Slightly	3 (15%)	Slightly	1 (5%)
How distressed do you get while playing sports/games	Almost always	18 (90%)	Moderately	10 (50%)
I close into my shell	Moderately	5 (25%)	Slightly	2 (10%)
How distressed are you by being unable to wear your favorite clothes	Almost always	17 (85%)	Moderately	8 (40%)
How distressed do you get when going to social events	Moderately	7 (30%)	Slightly	3 (15%)
How normal do you feel	Moderately	10 (50%)	Extremely	20 (100%)
At present, my self-consciousness has an adverse effect on my sex life	Moderately	8 (40%)	Slightly	2 (10%)

In Figures 3, pre- and post-operative photographs who underwent lipofilling are presented. The clinical outcomes of the procedure, including volume restoration and facial contouring, are clearly observable in these images

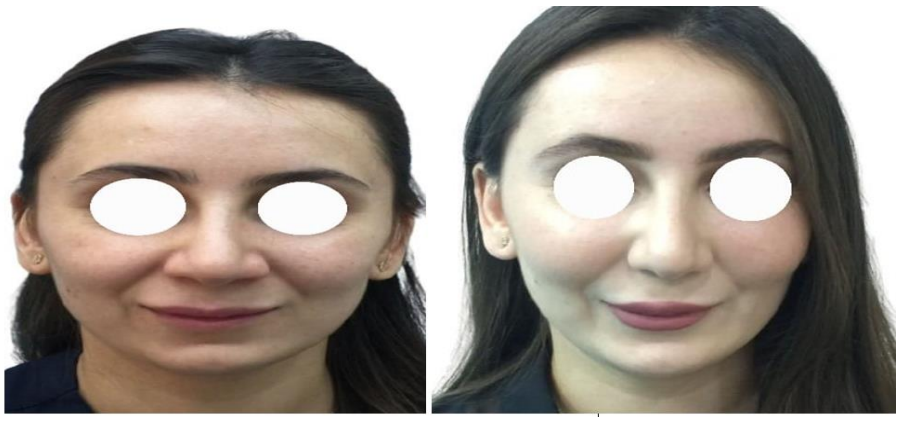

Figure 3: Lipofilling case

Figures 4 display before and after photos following soft tissue filler injections, demonstrating the aesthetic improvements achieved

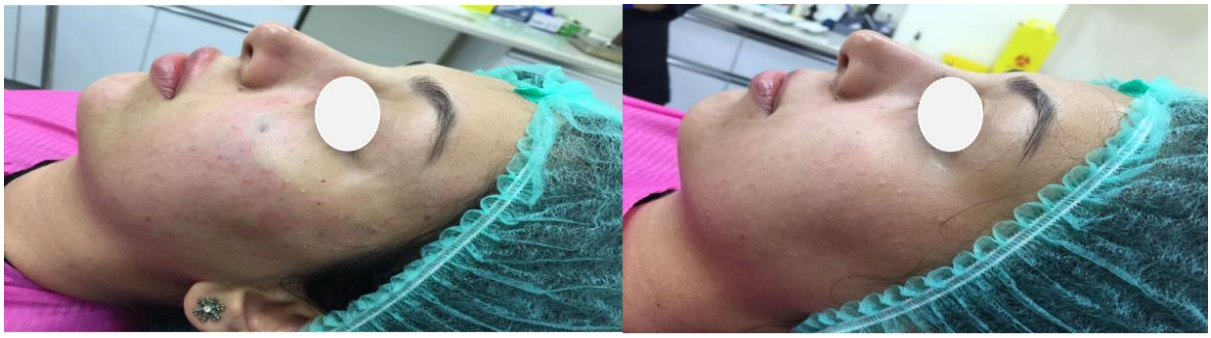

Figure 4: Before and after of a filler case

Figure 5 illustrates a case of post injection bruising as an adverse effect in a woman who received dermal filler treatment

Figure 5. This case is a complication of filler: bruising

Discussion

This study aimed to compare the outcomes and considerations of lipofilling and HA fillers for cheek augmentation, focusing on patient satisfaction, complication profiles, and psychological impact. The findings demonstrated that both lipofilling and HA fillers are effective for cheek rejuvenation, resulting in high levels of patient satisfaction and improved psychological well-being. However, lipofilling was associated with a higher incidence of minor side effects, while HA fillers offered a simpler recovery and fewer complications.

Notably, lipofilling provided greater satisfaction in terms of cheek evenness and a more favorable psychological impact. The results align with previous studies reporting high satisfaction rates for both lipofilling and

HA fillers in facial volumization (8,9). The superior evenness and naturalness observed with lipofilling may be attributed to the biocompatibility and integration of autologous fat, which blends more seamlessly with native tissues compared to synthetic fillers (10,11).

This is consistent with findings that autologous fat grafting can yield smoother and more uniform contours. Autologous fat, processed and reinjected using microcannula fanning, integrates diffusely within deep tissue planes, promoting seamless volumetric restoration and minimizing contour irregularities. In contrast, HA fillers, though precisely placed using atraumatic cannulas, are often deposited in localized boluses to achieve targeted projection.

While effective for focal augmentation, this technique may produce less uniform tissue integration, potentially explaining the lower evenness scores despite high overall satisfaction. This technical distinction underscores that naturalness in aesthetic outcomes is not merely a material property but a function of delivery method and tissue interaction (10, 11).

In terms of complications, the higher rate of minor side effects in the lipofilling group, such as swelling and bruising, is consistent with the more invasive nature of the procedure, which involves both fat harvesting and injection (12). Previous literature also notes that lipofilling carries a broader spectrum of minor complications, while severe adverse events remain rare (13). Conversely, HA fillers were associated mainly with bruising, and no severe vascular complications were observed in this study, likely due to the use of safe injection techniques and experienced practitioners (14,15).

This finding supports the importance of technical expertise and adherence to safety protocols in minimizing risks. Interestingly, the psychological benefits observed in both groups support findings from McKeown (2021) (16), and Cohen et al. (2021) (17), who noted improvements in self-confidence and social comfort following facial aesthetic procedures. The slightly greater psychological improvement in the lipofilling group may be due to the sense of naturalness and ownership associated with autologous fat (18). This study has several limitations. The relatively small sample size may not adequately capture rare complications or subtle intergroup differences, thereby restricting the generalizability of the findings. Although follow-up was conducted for 12 months, objective volumetric assessments (e.g., 3D imaging or caliper measurements) were not performed, limiting the ability to quantitatively evaluate long term filler persistence and to directly correlate patient-reported satisfaction with anatomical durability.

Furthermore, procedural discomfort was not formally assessed using standardized pain scales, such as the Visual Analog Scale, as this was not included in the original protocol. Future investigations should incorporate these objective and patient-centered measures to allow for a more comprehensive evaluation of both patient experience and long term clinical outcomes.

Conclusions

In summary, both lipofilling and HA fillers are effective for cheek augmentation, offering high satisfaction and psychological benefits. Lipofilling provides more natural and even results but with a higher rate of minor complications, while HA fillers are less invasive with fewer side effects.

The choice between these modalities should be individualized, considering patient goals, risk tolerance, and the surgeon’s expertise. Further research with larger samples and longer follow-up is recommended to confirm these findings and optimize patient care.

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Conflict of interest: All authors assert the absence of any conflict of interest.

Data availability: Upon reasonable request, the data from the research may be obtained from the corresponding author.

Authors' contributions: Each author made an equal contribution to this research work.

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