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ABSTRACT

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FACIAL FAT GRAFTING IN THE CORRECTION OF AGE CHANGES

Introduction. Autologous fat transplantation (lipofilling) holds particular interest as a method for correcting age-related changes in the face due to several unique properties. Firstly, the use of the patient's own fat ensures maximum biocompatibility and minimizes the risk of allergic reactions. Secondly, adipose tissue contains a significant number of adipose-derived stem cells (ADSC), which have regenerative potential, stimulate angiogenesis, collagen synthesis, and improve skin quality through paracrine mechanisms.

Objective. To study the effectiveness of autologous fat transplantation (lipofilling) in correcting age-related changes in the face and neck.

Methods. The study included 50 women with involitional changes in the face and neck. The donor site for fat was the inner thigh of the patients. The effectiveness of the procedure was evaluated by ultrasound measurements of skin thickness and subcutaneous fat in the cheekbone and upper cheek areas during three visits: visit 1 – before the procedure, visit 2 – three months after the procedure, and visit 3 – six months after the procedure.

Results. Three months after the procedure, skin thickening in the cheekbone area was noted, increasing from 1.73 ± 0.16 mm to 2.08 ± 0.35 mm (>0.05). After six months, a slight, non-significant reduction (>0.05) was observed, although the value remained higher than at visit 1 (1.90 ± 0.38 mm). A similar trend was observed when analyzing the thickness of the skin in the upper cheeks. The thickness of the cheekbone fat pads was significantly higher at visit 2 (9.72 ± 1.02 mm) and visit 3 (9.85 ± 1.16 mm) compared to visit 1 (5.02 ± 0.78 mm). The aesthetic effect of autologous fat transplantation persisted for six months, which can be considered an excellent result. A similar outcome was observed in the analysis of the thickness of the cheek fat pads.

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Conclusions. Autologous fat transplantation is an effective method for correcting involuntal facial changes in middle-aged women, as confirmed by six-month follow-up results in a group of 50 patients. The success of the procedure largely depends on the technical aspects of its performance, including the atraumatic harvesting of fat, proper processing, and injection technique.

Keywords: autologous fat transplantation, lipofilling, involuntal facial changes, rhytidectomy, donor, recipient.

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ЛІПОФІЛІНГ В КОРЕКЦІЇ ВІКОВИХ ЗМІН ОБЛИЧЧЯ

Вступ. Трансплантація аутологічного жиру (ліпофілінг) представляє особливий інтерес як метод корекції вікових змін обличчя, завдяки низці унікальних властивостей. По-перше, використання власної жирової тканини забезпечує максимальну біосумісність та мінімізує ризик алергічних реакцій. По-друге, жирова тканина містить значну кількість стовбурових клітин (Adipose-derived stem cells (ADSC)), які володіють регенеративним потенціалом, здатні стимулювати ангиогенез, синтез колагену та покращувати якість шкіри через паракринні механізми.

Мета. Вивчення ефективності трансплантації аутологічного жиру (ліпофілінгу) в корекції вікових змін обличчя і шиї.

Методи. В дослідження було включено 50 жінок з інволютивними змінами обличчя і шиї. Донорською зоною була внутрішня поверхня стегон пацієнток.

Ефективність процедури оцінювали за допомогою ультразвукового вимірювання товщини шкіри і підшкірного жиру у зоні вилиці та верхньої третини щоки під час трьох візитів: візит 1 – до процедури, візит 2 – через 3 місяці після процедури, візит 3 – через 6 місяців після процедури.

Результати. Ми встановили, що через 3 місяці після процедури відмічалася потовщення шкіри виличної зони – з $1,73 \pm 0,16$ мм до $2,08 \pm 0,35$ мм ($>0,05$). Через 6 місяців відмічалася невірогідне ($>0,05$) зменшення цього показника, однак він залишався вищим, ніж показник візиту 1 ($1,90 \pm 0,38$). Аналогічну динаміку ми спостерігали при аналізі товщини шкіри верхньої частини щік. Товщина жирових подушок вилиць була вірогідно вищою на візиті 2 ($9,72 \pm 1,02$ мм) і візиті 3 ($9,85 \pm 1,16$), у порівнянні з візитом 1 ($5,02 \pm 0,78$ мм). Естетичний ефект трансплантації аутологічного жиру зберігався впродовж 6 місяців, що можна було розцінити, як відмінний результат. Подібний результат ми відмічали і при аналізі товщини жирових подушок щоки.

Висновки. Метод трансплантації аутологічного жиру є ефективним способом корекції інволютивних змін обличчя у жінок середнього віку, що підтверджується 6-місячними результатами спостереження за групою з 50 пацієнток. Успішність процедури значною мірою залежить від технічних аспектів її виконання, включаючи atraumaticність забору жирової тканини, правильність її обробки та техніку введення.

Ключові слова: трансплантація аутологічного жиру, ліпофілінг, інволютивні зміни обличчя, ритидектомія, донор, реципієнт.

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INTRODUCTION

The issue of correcting involuntional changes in the face is one of the most pressing topics in modern aesthetic medicine. Facial aging is a complex process that involves not only ptosis of soft tissues but also a significant loss of volume, leading to the formation of specific signs of an aged appearance. According to current research, the loss of facial soft tissue volume begins as early as 30–35 years of age and progresses with time, making this issue socially significant for middle-aged women [1].

The modern concept of volumetric facial rejuvenation is based on understanding the intricate age-related changes occurring at various tissue levels. Recent studies show that involuntional changes include not only atrophy of the subcutaneous fat but also bone resorption, muscle atrophy, and connective tissue degeneration. These alterations lead to a complex change in facial architecture, necessitating methods capable of restoring lost tissue volume [2, 3].

Autologous fat transplantation (lipofilling) is of particular interest as a method for correcting facial aging due to several unique properties. First, the use of the patient's own fat tissue ensures maximum biocompatibility and minimizes the risk of allergic reactions. Second, adipose tissue contains a significant number of stem cells (adipose-derived stem cells (ADSC)), which have regenerative potential, capable of stimulating angiogenesis, collagen synthesis, and improving skin quality through paracrine mechanisms. Moreover, transplanted fat tissue can function as a natural depot for stem cells, providing a long-lasting rejuvenating effect [4, 5, 6].

An important aspect is the economic accessibility of the technique, as the use of one's own fat tissue eliminates the need for expensive fillers or implants. At the same time, results can be long-lasting when the procedure is performed with proper technical execution [6, 7, 8].

However, despite its evident advantages, this method still has unresolved issues that require further study. In particular, standardized protocols for fat harvesting, processing, and injection are lacking, leading to variability in outcomes across different clinics. Additionally, the ability to predict the survival rate of the

transplanted fat and the factors influencing it remains a matter of debate [9, 10].

The standardization of result evaluation in lipofilling is also a notable concern. Most studies rely on subjective photo assessments, while objective evaluation methods (3D scanning, MRI, ultrasound) are rarely used due to their complexity and cost [10, 11].

Another issue insufficiently addressed in the literature is the differentiated approach for patients of different age groups. For middle-aged women (35–50 years), it is crucial to determine the optimal fat injection volumes for various anatomical zones and develop criteria for predicting the procedure's effectiveness [12, 13].

All the above-mentioned points highlight the need for further exploration of autologous fat transplantation's potential in correcting involuntional facial changes in middle-aged women, which defines the goal of this study.

MATERIALS AND METHODS

The study included 50 women with involuntional changes in the face and neck. Inclusion criteria were: volume loss in the cheeks and temples, deepening of the nasolabial folds, loss of facial contour definition, deepening of the tear trough, facial asymmetry, stable body weight during the study, and mesomorphic or endomorphic body constitution. Exclusion criteria included: patients younger than 34 years or older than 51 years, hematological diseases, oncopathology, active infections of any localization, uncontrolled diabetes, autoimmune diseases, pregnancy, and lactation. The average BMI was 26.0 ± 2.0 kg/m², and body fat percentage based on Hodgdon-Beckett was 27.0 ± 2.0 .

The donor area was the inner thigh. Autologous fat was harvested using a 10 mm syringe with a blunt cannula of 3 mm in diameter. The average volume of harvested material was 100–150 mm. To obtain stromal vascular fraction (SVF), the material was centrifuged for 60 seconds, emulsified, and centrifuged again for 300 seconds. Three layers were obtained, with the lower one containing the SVF. This layer was separated, and autologous fat was added to achieve the required volume for lipofilling.

The procedure's effectiveness was assessed by ultrasound measurement of the skin and subcutaneous fat thickness in the cheekbone area and upper third of the cheek during three visits: visit 1 – before the procedure,

visit 2 – three months after the procedure, and visit 3 – six months after the procedure.

RESULTS

We found that three months after the procedure, there was an increase in skin thickness in the cheekbone area from 1.73 ± 0.16 mm to 2.08 ± 0.35 mm ($p > 0.05$). After six months, there was a slight but insignificant ($p > 0.05$) decrease in this measure, though it remained higher than the pre-procedure level at visit 1 (1.90 ± 0.38 mm). A similar trend was observed when analyzing the skin thickness of the upper cheek (Fig. 1).

The thickness of the cheekbone fat pads was significantly higher at visit 2 (9.72 ± 1.02 mm) and visit 3 (9.85 ± 1.16 mm) compared to visit 1 (5.02 ± 0.78 mm). The aesthetic effect of autologous fat transplantation lasted for six months, which could be considered an excellent result.

Analysis of cheek fat pad thickness showed a significant (< 0.05) increase at visit 2 (8.02 ± 0.43 mm) compared to visit 1 (4.19 ± 0.44 mm). After six months, this measure remained significantly (< 0.05) higher (8.13 ± 0.51 mm) than at visit 1 and insignificantly ($p > 0.05$) higher than at visit 2.

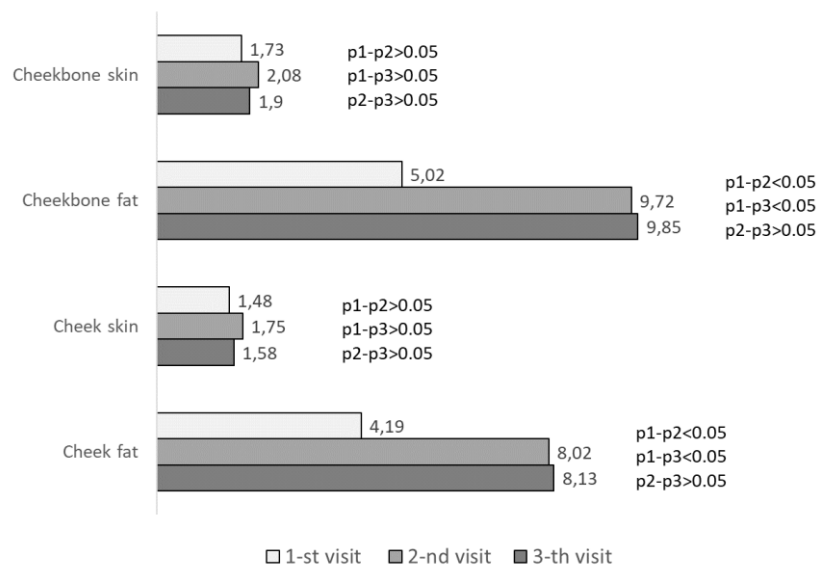


Fig. 1. Ultrasound measurement results of the skin and subcutaneous fat of the face (mm) before the lipofilling procedure and over time (3 and 6 months)

Overall, the positive effect of transplantation in all zones persisted for six months. None of the patients experienced complications in either the recipient or donor areas.

DISCUSSION

The results obtained in this study demonstrate the long-term (6 months) effectiveness of autologous fat transplantation as a method for correcting involitional facial changes in middle-aged women. Currently, modern trends in lipofilling techniques reflect a shift from simple fat transfer to the concept of “regenerative lipofilling.” This approach is based on the understanding that adipose tissue is not merely a filler but a biologically active material rich in stem cells and growth factors [1, 14]. Our study confirms the effectiveness of this approach, showing not only volume restoration but also improvement in skin quality in the areas of injection.

Current aesthetic medicine places significant emphasis on the depth and area of fat tissue injection. According to recent studies, multi-layer injection,

tailored to the individual characteristics of each anatomical zone, is optimal. Our results correlate with findings from other authors regarding better fat retention when distributed in thin layers across different planes [2, 3, 4].

Analysis of the study results may indicate several key factors that influence the effective retention of transplanted fat: the use of appropriately sized cannulas, minimal trauma during aspiration, the correct selection of donor areas, adherence to centrifugation techniques that preserve the stromal vascular fraction (SVF), and optimal depth and uniform distribution of fat in the recipient area [4, 9].

The current stage of development in aesthetic medicine is characterized by the rapid introduction of innovative technologies and techniques, opening new perspectives for optimizing the lipofilling procedure. Notably, enriching fat grafts with biologically active components, such as platelet-rich plasma (PRP), is of great interest. Numerous studies demonstrate that high concentrations of growth factors found in PRP

significantly enhance the survival rate of fat grafts and stimulate regenerative processes in surrounding tissues [14].

There is substantial potential for optimizing lipofilling results through the use of the stromal vascular fraction of adipose tissue (SVF). This fraction, rich in mesenchymal stem cells and progenitor cells, can significantly improve transplant vascularization and stimulate tissue regeneration. Research indicates that preserving and concentrating SVF during fat graft processing not only increases graft survival rates but also enhances the overall rejuvenating effect of the procedure [17].

Technological innovations in the harvesting and processing of adipose tissue also play a key role in improving the effectiveness of the technique. The development of new systems for atraumatic tissue harvesting allows for maximum preservation of adipocyte viability and the structure of fat lobules. Automated aspiration systems, which ensure standardized pressure during harvesting and minimize mechanical damage to cells, deserve special attention [9].

Recent studies increasingly emphasize the importance of a personalized approach to lipofilling. Individualizing treatment protocols that consider specific aging characteristics of the patient, anatomical features, and the quality of the recipient tissue allows for more predictable and stable results. Special focus is placed on optimizing injection techniques based on the specifics of different anatomical areas of the face [9, 15, 16].

A promising direction is also the integration of lipofilling with other aesthetic medicine techniques. A combined approach that includes the use of hardware technologies and injection techniques can achieve a synergistic effect and maximally meet patients' aesthetic needs. In particular, combining lipofilling with RF lifting or laser rejuvenation shows promising results in correcting complex age-related changes [10].

An important aspect of optimizing the technique is the improvement of preoperative patient preparation. Modern protocols include measures aimed at stimulating the regenerative potential of tissues, improving microcirculation, and optimizing cellular metabolism.

Special attention is given to correcting metabolic disorders and optimizing nutrition, which can significantly influence the final outcome of the procedure [1, 2, 3].

Molecular mechanisms of fat graft retention remain subjects of active scientific research. A deeper understanding of the factors influencing adipocyte survival, the role of stem cells, and the significance of the microenvironment opens new opportunities for optimizing the technique. Concurrently, objective methods for assessing results, including 3D modeling and ultrasound diagnostics, allow for more accurate monitoring of procedure effectiveness [4, 9, 14, 17].

Thus, current trends in optimizing lipofilling techniques are characterized by a comprehensive approach that combines the use of advanced biotechnologies, technical enhancements of the procedure, and individualization of treatment protocols. Further development of these directions will enhance the effectiveness and predictability of procedure outcomes, making it even more appealing for patients and aesthetic medicine specialists. Therefore, the conducted study confirms the effectiveness and safety of autologous fat transplantation in correcting involuntal facial changes in middle-aged women. The obtained results correlate with contemporary trends in the development of the technique and open up prospects for further optimization of the procedure.

CONCLUSIONS

The method of autologous fat transplantation is an effective way to correct involuntal facial changes in middle-aged women, as confirmed by the 6-month follow-up results from a group of 50 patients. The success of the procedure largely depends on the technical aspects of its execution, including the atraumatic nature of fat tissue harvesting, proper processing, and injection technique.

Future research should focus on improving donor material harvesting techniques and developing methods for calculating the optimal volume necessary for recipient areas.

AUTHOR CONTRIBUTIONS

1. Olexandr Aleksandruk – given final approval to the manuscript version submitted for publication
2. Ivan Labiak – contributed to the conception and design of the study
3. Andrii Hutsuliak – acquisition, analysis and interpretation of data, drafted the manuscript and revised it critically for content
4. Oleksandr Prudnikov – acquisition, analysis and interpretation of data
5. Vitaliia Atamaniuk – drafted the manuscript and revised it critically for content.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

- Bray D, Talei B. Male Deep-Plane Face and Neck Lifting: Advanced and Customized Techniques. *Facial Plast Surg Clin North Am.* 2024;32(3):339-351. <https://doi.org/10.1016/j.fsc.2024.02.003>
- Hu H, Shi Y, Qian Y, et al. Pyramidal multiple-theory (multi-type, multi-method and multi-layer) for facial fat grafting. *J Cosmet Dermatol.* 2023;22(3):937-944. <https://doi.org/10.1111/jocd.15525>
- Schiraldi L, Sapino G, Meuli J, et al. Facial Fat Grafting (FFG): Worth the Risk? A Systematic Review of Complications and Critical Appraisal. *J Clin Med.* 2022;11(16):4708. Published 2022 Aug 11. <https://doi.org/10.3390/jcm11164708>
- Benslimane F, Pessoa Ladvoat Cintra H. 15 Years of Upper Eyelid Micro-fat Graft: the Good, the Bad and the Ugly. *Aesthetic Plast Surg.* 2021;45(3):1035-1046. <https://doi.org/10.1007/s00266-020-01946-1>
- Yang F, Ji Z, Peng L, et al. Efficacy, safety and complications of autologous fat grafting to the eyelids and periorbital area: A systematic review and meta-analysis. *PLoS One.* 2021;16(4):e0248505. Published 2021 Apr 1. <https://doi.org/10.1371/journal.pone.0248505>
- Song P, Xu X, Chen M, Pu LLQ. Prevention and Management of Serious Complications After Facial Fat Grafting. *Clin Plast Surg.* 2020;47(1):165-171. <https://doi.org/10.1016/j.cps.2019.08.013>
- Egro FM, Coleman SR, Rubin JP. Fat Grafting for Treatment of Secondary Facial Deformity. *Clin Plast Surg.* 2020;47(1):147-154. <https://doi.org/10.1016/j.cps.2019.08.011>
- Gentile P, Ossanna R, Sierra LAQ, Sbarbati A. Mechanical Purification of Lipofilling: The Relationship Between Cell Yield, Cell Growth, and Fat Volume Maintenance. *Aesthetic Plast Surg.* 2024;48(12):2306-2318. <https://doi.org/10.1007/s00266-024-03870-0>
- Egro FM, Coleman SR. Facial Fat Grafting: The Past, Present, and Future. *Clin Plast Surg.* 2020;47(1):1-6. <https://doi.org/10.1016/j.cps.2019.08.004>
- Hua Z, Wei P. Lipofilling after Laser-Assisted Treatment for Facial Filler Complication: Volumetric and Regenerative Effect. *Plast Reconstr Surg.* 2021;148(6):1054e. <https://doi.org/10.1097/PRS.00000000000008540>
- Maamari RN, Massry GG, Holds JB. Complications Associated with Fat Grafting to the Lower Eyelid. *Facial Plast Surg Clin North Am.* 2019;27(4):435-441. <https://doi.org/10.1016/j.fsc.2019.07.001>
- Almadori A, Fung SC, Denton CP, Butler PEM. Fat Grafting and Adipose Stem Cells for Facial Systemic Sclerosis: A Systematic Review of the Literature. *Aesthet Surg J.* Published online September 26, 2024. <https://doi.org/10.1093/asj/sjae200>
- Nasim S, Nasim H, Kauke M, Safi AF. Autologous fat grafting for cosmetic temporal augmentation: a systematic review. *Front Surg.* 2024;11:1410162. Published 2024 Sep 20. <https://doi.org/10.3389/fsurg.2024.1410162>
- Abellan Lopez M, Philandrianos C, Daumas A, et al. Assessing the effect of PRP addition to facial micro-lipofilling for patients suffering from Scleroderma: A prospective routine care analysis. *Ann Chir Plast Esthet.* 2023;68(2):152-161. <https://doi.org/10.1016/j.anplas.2022.07.016>
- El Omari M, Debarh M, Lakhdari MA, Basri Z, Ait Benhamou R. Adipose Tissue Grafting for the Treatment of Morphea En Coup De Sabre: A Simple Filler or an Emerging Cellular Therapy?. *Cureus.* 2022;14(10):e30358. Published 2022 Oct 16. <https://doi.org/10.7759/cureus.30358>
- Barone M, Cogliandro A, Salzillo R, et al. Midface Lift Plus Lipofilling Preferential in Patients with Negative Lower Eyelid Vectors: A Randomized Controlled Trial. *Aesthetic Plast Surg.* 2021;45(3):1012-1019. <https://doi.org/10.1007/s00266-020-01971-0>
- Daumas A, Magalon J, Jouve E, et al. Adipose tissue-derived stromal vascular fraction for treating hands of patients with systemic sclerosis: a multicentre randomized trial Autologous AD-SVF versus placebo in systemic sclerosis. *Rheumatology (Oxford).* 2022;61(5):1936-1947. <https://doi.org/10.1093/rheumatology/keab584>

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