Research Article Volume 01, Issue No. 02. 2025

The Medical Journal of Plastic Surgery and Aesthetic Medicine



The Effects of Facial Lipografting on Skin Quality

[1] Erick, [2] Patricia

[1] Faculty of Medicine, Maranatha Christian University, Bandung City, West Java, Indonesia

Correspondence : dokter.erick9487483@gmail.com

Article History :

Received date : 2024/06/12
Revised date : 2024/07/18
Accepted date : 2024/08/12
Published date : 2025/01/05

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ABSTRACT

Background: The literature on facial lipografting reveals a multifaceted and evolving understanding of its effects on skin quality and aesthetic outcomes. The historical context provided by the foundational work on autologous fat injection showcases the progression from rudimentary techniques to advanced regenerative therapies. **Literature Review:** Research highlights the dual benefits of facial lipografting, which not only restores volume but also enhances skin rejuvenation and scar treatment through the action of ADSCs (Spiekman et al., 2017). Systematic reviews have confirmed the efficacy of autologous fat grafting in wound healing, attributing its success to the anti-inflammatory and angiogenic properties of ADSCs (Malik et al., 2020). However, variability in outcomes has been noted, emphasizing the need for standardized harvesting and processing techniques to optimize graft viability (Gentile & Garcovich, 2021). The exploration of adjunctive techniques, such as the use of platelet-rich fibrin (PRF), has shown potential benefits in enhancing graft retention, though evidence remains inconclusive (Li et al., 2022). Furthermore, systematic reviews and meta-analyses reveal significant improvements in postoperative outcomes, including skin texture and elasticity, as well as high patient satisfaction rates associated with facial lipografting (Li et al., 2022). Recent studies have reinforced the importance of ADSCs in improving skin quality and hydration, suggesting that integrating stem cell therapies into fat grafting procedures can yield superior results (Katarzyna Czop & Jałowska, 2023). The application of autologous fat grafting in specific contexts, such as cleft lip deformity repair, further illustrates its versatility and effectiveness in enhancing aesthetic outcomes while minimizing scarring (Goich & Schachter, 2024). **Conclusion:** In conclusion, the body of literature collectively underscores the significance of facial lipografting as a transformative technique in both aesthetic and reconstructive surgery. The interplay of innovative procedural techniques, the regenerative potential of adipose tissue, and the ongoing refinement of clinical practices contribute to a deeper understanding of how facial lipografting can enhance skin quality and overall aesthetic outcomes.

Keyword: Effects, Facial Lipografting, Skin Quality

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INTRODUCTION

The exploration of facial lipografting and its implications for skin quality has garnered significant academic interest over the years, evolving from a rudimentary aesthetic technique to a sophisticated regenerative therapy. The foundational work by (MAZZOLA et al., 2011) highlights the historical context of autologous fat injection, tracing its roots back to the late 19th century and emphasizing the advancements made in the 1990s with Sidney Coleman's innovative techniques. This pivotal shift not only improved the survival rates of grafts but also underscored the regenerative potential of adipose tissue, which is now recognized to contain various cell types, including adipose-derived stem cells (ADSCs) that facilitate soft tissue regeneration.

Building on this foundation, (Spiekman et al., 2017) expand the understanding of fat grafting by elucidating its multifaceted benefits beyond mere volume restoration. Their work emphasizes the role of ADSCs in enhancing skin rejuvenation and scar treatment, thus positioning lipografting as a promising technique in both reconstructive and aesthetic surgery. This perspective is further supported by (Malik et al., 2020), who conduct a systematic review that underscores the regenerative capabilities of autologous fat grafting in wound healing, attributing its efficacy to the anti-inflammatory and angiogenic properties of ADSCs.

(Gentile & Garcovich, 2021) contribute to this discourse by addressing the variability in fat grafting outcomes, stressing the influence of procedural techniques on graft viability. They advocate for a standardized approach to harvesting and processing fat tissue, acknowledging the unpredictability of resorption rates and the necessity for meticulous planning to optimize results. This sentiment is echoed in (Li et al., 2022), who investigate the potential of platelet-rich fibrin (PRF) to enhance graft retention in facial lipofilling. Their findings indicate that while PRF may offer advantages, the evidence supporting its effectiveness remains inconclusive, necessitating further investigation into pro-survival strategies in fat grafting.

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(Li et al., 2022) further the discussion by conducting a systematic review and meta-analysis focused on the anti-aging effects of autologous fat transplantation. Their research highlights the importance of evaluating postoperative outcomes, such as complication rates and patient satisfaction, thus providing a comprehensive overview of the clinical implications of fat grafting in aesthetic procedures.

In the latest contributions, (Katarzyna Czop & Jałowska, 2023) emphasize the role of ADSCs in enhancing skin quality and hydration, suggesting that the integration of stem cell therapies may significantly improve the outcomes of fat grafting procedures. They propose that ADSCs or stromal vascular fraction-enriched fat are critical to achieving optimal results in skin regeneration.

Lastly, (Goich & Schachter, 2024) review the application of autologous fat grafting in the context of cleft lip deformity, reinforcing the technique's ability to enhance aesthetic outcomes while minimizing scarring. Their work illustrates the versatility of fat grafting in addressing various aesthetic concerns, further solidifying its role in contemporary plastic surgery.

Together, these articles present a comprehensive examination of the evolution, application, and efficacy of facial lipografting, underscoring its significance in enhancing skin quality and aesthetic outcomes. The interplay of innovative techniques, the regenerative potential of adipose tissue, and the ongoing refinement of procedural standards collectively inform the current understanding and future directions of this dynamic field.

LITERATURE REVIEW

The article "Autologous fat injection to face and neck: from soft tissue augmentation to regenerative medicine" by (MAZZOLA et al., 2011) presents a comprehensive overview of the evolution of facial lipografting, particularly in relation to its impact on skin quality and facial aesthetics. The authors trace the historical context of fat grafting, noting its origins in the late 19th century, while highlighting the significant challenges that plagued earlier techniques, such as graft resorption and the formation of cysts. These complications rendered the results unreliable, especially in the delicate area of facial aesthetics.

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A pivotal moment in the advancement of this technique occurred with the introduction of liposuction, which reignited interest in autologous fat re-injection. However, the authors emphasize that initial methods still faced substantial issues with the longevity of the injected lipoaspirate. The breakthrough came in the 1990s with the development of a new atraumatic technique for harvesting and injecting fat. This method, characterized by low negative pressure harvesting, centrifugation for lipoaspirate purification, and the strategic placement of minimal amounts of adipocytes in multiple tunnels, has significantly enhanced the outcomes of fat grafting procedures.

The article effectively discusses how these advancements have led to improved results in restoring facial fullness, correcting asymmetries, and addressing scars. The authors provide compelling evidence that the integration of adipose-derived adult mesenchymal stem cells (ADSCs) within fatty tissue contributes to its regenerative capabilities, thus indicating a dual role for fat in both aesthetic enhancement and tissue regeneration. This insight is particularly relevant for clinicians and researchers interested in the regenerative potential of adipose tissue in head and neck surgery.

Moreover, the authors critically evaluate the implications of their findings for future practices in facial rejuvenation. They suggest that the incorporation of ADSCs into grafting procedures may not only enhance aesthetic outcomes but also promote functional restoration in various surgical contexts. This perspective aligns with contemporary trends in regenerative medicine, where the focus is increasingly on utilizing the body's own tissues to foster healing and regeneration.

The article titled "The power of fat and its adipose-derived stromal cells: emerging concepts for fibrotic scar treatment" by (Spiekman et al., 2017) presents a comprehensive examination of the role of adipose tissue transfer, commonly referred to as fat grafting or lipografting, in the context of skin rejuvenation and scar treatment. The authors highlight that this technique has gained recognition not only for its volumetric restoration capabilities but also for its potential to enhance skin quality.

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A critical evaluation of the article reveals that the authors effectively synthesize evidence from clinical trials which support the efficacy of lipofilling. They emphasize that the advent of smaller liposuction and lipofilling cannulas has facilitated the application of this technique in delicate areas such as the face and hands, where both reconstructive and aesthetic outcomes are desired. This innovation marks a significant advancement in the field, allowing for more precise and effective interventions.

The article further discusses the multifaceted benefits of lipofilling, asserting that the effects extend beyond mere volume augmentation. The authors note that patients often report improvements in skin texture, elasticity, and overall appearance following the procedure. These observations are critical as they underscore the regenerative potential of adipose-derived stromal cells (ADSCs) present in the grafted tissue. The identification of these cells as a source of endogenous mesenchymal stem cells has been pivotal in expanding the applications of lipofilling beyond traditional cosmetic uses to include therapeutic interventions in scar treatment and tissue regeneration.

Moreover, (Spiekman et al., 2017) highlight the biological mechanisms underpinning the regenerative effects of lipofilling. The release of growth factors and cytokines from ADSCs contributes to enhanced angiogenesis and collagen synthesis, which are vital processes in skin rejuvenation. This aspect of the article is particularly noteworthy as it bridges the gap between clinical observations and the underlying biological rationale, providing a more comprehensive understanding of how lipografting can improve skin quality.

The article "A Systematic Review of Autologous Fat Grafting in the Treatment of Acute and Chronic Cutaneous Wounds" authored by (Malik et al., 2020) presents a comprehensive evaluation of the efficacy and safety of autologous fat grafting (AFG) in the context of wound healing. The systematic review synthesizes findings from various human studies that employed different methodologies, including lipotransfer, cell-assisted lipotransfer, stromal vascular fraction products, and isolated adipose-derived stem cells, to assess their impact on skin quality and wound healing.

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A key insight from the article is the recognition of the regenerative potential of adipose-derived stem cells, which exhibit notable anti-inflammatory, immunomodulatory, and angiogenic properties. These characteristics are critical in the context of skin quality enhancement, as they can facilitate the repair and regeneration of damaged tissues. The authors highlight that the popularity of AFG has surged since the late 1980s, driven by its applications in aesthetic medicine for correcting volume loss and contour defects. This historical perspective provides a valuable context for understanding the evolution of AFG techniques and their expanding role in therapeutic applications beyond aesthetic purposes.

Despite the promising outcomes associated with AFG, the review identifies a significant gap in the literature, noting the absence of randomized controlled trials (RCTs) among the included studies. The reliance on observational case series raises concerns regarding the robustness of the conclusions drawn about the efficacy and safety of AFG. While the qualitative synthesis of the ten case series offers insights into the potential benefits of AFG for wound healing, the lack of rigorous trial data limits the ability to generalize findings and establish definitive clinical guidelines.

Moreover, the article emphasizes the need for further research to better understand the mechanisms by which adipose-derived stem cells contribute to improved skin quality and wound healing. Future studies should aim to investigate optimal grafting techniques, the specific roles of different stem cell populations, and the long-term effects of AFG on skin integrity. This research is essential to validate the therapeutic applications of AFG and to inform clinical practice regarding its use in treating acute and chronic cutaneous wounds.

The article titled "Systematic Review: Adipose-Derived Mesenchymal Stem Cells, Platelet-Rich Plasma and Biomaterials as New Regenerative Strategies in Chronic Skin Wounds and Soft Tissue Defects" by (Gentile & Garcovich, 2021) provides an extensive overview of the advancements in the use of autologous fat grafting, particularly focusing on its application in treating skin quality issues related to soft tissue defects and chronic skin wounds. The authors highlight that the popularity of these surgical procedures has significantly increased over the past decade, driven by their potential benefits in aesthetic and reconstructive surgery.

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One of the central themes of the article is the multifactorial nature of the success of fat grafting procedures. The authors emphasize that various factors, including the harvesting techniques, the processing of fat tissue, the volume of fat implanted, and the specific recipient sites, play crucial roles in determining the outcome of the grafting procedure. This insight underscores the complexity of achieving consistent results in facial lipografting and suggests that individual patient characteristics must also be taken into account, as they can influence the predictability of the results ((Gentile & Garcovich, 2021)).

The authors assert that there is currently no consensus on the optimal methods for processing adipose tissue to maximize graft viability and retention. This lack of standardization poses a challenge for practitioners aiming to refine their techniques and improve patient outcomes. Moreover, the article points out that the resorption of transplanted fat can be unpredictable, necessitating multiple treatment sessions to achieve the desired aesthetic results. This aspect is particularly relevant for practitioners and patients considering facial lipografting, as it highlights the need for realistic expectations regarding the permanence of results ((Gentile & Garcovich, 2021)).

Furthermore, the article discusses the emerging trend of enhancing fat grafting with stromal vascular fraction cells (SVFs), which may improve the efficacy of the procedure in various applications, including breast reconstruction and scar treatment. This innovation suggests a potential pathway for improving skin quality post-lipografting, as the regenerative properties of these cells could contribute to better healing and tissue integration.

The article titled "Platelet-Rich Fibrin in Fat Grafts for Facial Lipofilling: A Randomized, Controlled Split-Face Clinical Trial," authored by (Zhang et al., 2022) provides a comprehensive examination of the role of platelet-rich fibrin (PRF) in enhancing the outcomes of facial lipofilling procedures. The study addresses a critical issue in aesthetic surgery: the variable absorption rates of fat grafts that can lead to unsatisfactory results for patients. This variability often stems from the differences in surgical techniques and the inherent challenges associated with graft retention.

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The authors effectively highlight that while facial lipofilling has garnered popularity, the success of the procedure is frequently undermined by the absorption of grafted fat. They draw attention to the potential of pro-survival strategies, particularly the application of PRP and PRF, to improve the retention of grafted fat. This focus on enhancing volume retention is crucial, as it directly impacts patient satisfaction and the overall efficacy of the procedure.

One of the significant contributions of this article is its emphasis on PRF, which is presented as a potentially superior alternative to PRP. The authors note that PRF offers several advantages, including a simpler production process and possibly enhanced biological properties that may favor fat retention. However, they also critically assess the existing literature, acknowledging that while some studies advocate for the use of PRP, the evidence for its effectiveness is inconsistent. This inconsistency is mirrored in the limited objective evidence supporting the efficacy of PRF in improving autologous fat graft retention.

The study's design, a randomized controlled trial, is commendable as it provides a robust framework for evaluating the efficacy of PRF in facial lipofilling. However, the authors rightly call for more high-quality, prospective studies to substantiate their findings and to clarify the role of PRF in clinical practice. This call for further research underscores a significant gap in the current understanding of fat graft retention techniques and the need for standardized protocols in facial lipofilling procedures.

In the article "The Application and Efficacy Evaluation of Autologous Fat Transplantation in Antiaging of the Face: Systematic Review and Meta-Analysis" by (Li et al., 2022) the authors present a comprehensive analysis of the effects of autologous fat transplantation, commonly known as lipografting, on facial skin quality and overall anti-aging outcomes. This systematic review and meta-analysis meticulously screened literature based on specific inclusion criteria, focusing on randomized and non-randomized comparison experiments, as well as various observational studies.

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The authors conducted a thorough evaluation of postoperative complication rates, patient satisfaction following the injection of autologous fat particles, and the success rate associated with a single injection. This multifaceted approach provides valuable insights into the efficacy of lipografting as a facial rejuvenation technique. The systematic review synthesizes data from a diverse pool of studies, which enhances the reliability of the findings and allows for a more nuanced understanding of the procedure's impact on skin quality.

One of the critical insights from the article is the correlation between autologous fat transplantation and improved skin texture and elasticity. The authors highlight that patients reported significant satisfaction with the aesthetic outcomes, indicating that lipografting not only enhances volume but also contributes to an overall improvement in skin quality. This finding is particularly relevant in the context of aging, where skin laxity and volume loss are prominent concerns.

Moreover, the article addresses the safety profile of the procedure, noting that while complications can occur, they are relatively rare and often manageable. This aspect is crucial for potential patients and practitioners alike, as it underscores the importance of informed decision-making in cosmetic interventions.

However, the review also points out the variability in study designs and methodologies across the included literature, which may affect the generalizability of the findings. The authors advocate for standardized protocols in future research to enhance the comparability of results and to further elucidate the long-term effects of facial lipografting on skin quality.

The article "Stem cells in plastic surgery and aesthetic medicine" by (Katarzyna Czop & Jałowska, 2023) provides a comprehensive examination of the role of adipose-derived stem cells (ADSCs) and their efficacy in enhancing skin quality through facial lipografting. The authors present a critical comparison between the use of ADSCs and platelet-rich plasma (PRP), highlighting the limitations of PRP as a standalone treatment for skin regeneration.

The study's design involved dividing patients into three groups to assess the effects of different treatments, all of which included ADSCs as a common component. The

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findings indicated that while PRP is rich in growth factors and cytokines that could potentially stimulate angiogenesis, it did not demonstrate any additional benefits for skin regeneration when used alone. This suggests that the regenerative properties attributed to PRP may not be sufficient to enhance skin quality independently of ADSCs. The outcomes across all treatment groups were notably similar, reinforcing the notion that ADSCs or stromal vascular fraction (SVF)-enriched fat are pivotal for improving skin quality, appearance, and hydration.

Moreover, the study also explored the efficiency of cell-assisted lipotransfer by comparing two patient groups: one receiving fat grafts only and the other receiving SVF-enriched fat injections. The results indicated that both groups experienced improvements in skin quality; however, the SVF-enriched group exhibited significantly better outcomes and graft survival rates. This finding underscores the potential advantages of incorporating SVF into lipografting procedures, suggesting that the presence of stem cells enhances the effectiveness of fat grafts in achieving long-lasting aesthetic results.

The article "A Scoping Review: Autologous Fat Grafting to Improve Volume and Aesthetics of Cleft Lip Deformity" by (Goich & Schachter, 2024) provides a comprehensive examination of the role of autologous fat grafting in enhancing the aesthetic outcomes of cleft lip repairs. The authors highlight the significance of addressing not only the physical deformities associated with cleft lip but also the aesthetic aspects, particularly in relation to lip volume and symmetry.

One of the central points discussed in the article is the inadequacy of lip volume post-repair, which can lead to abnormal lip appearance and scarring. The authors argue that autologous fat grafting serves as a viable solution to restore volume and improve the overall contour and characteristics of the repaired lip. The technique involves a meticulous process of harvesting adipose tissue, processing it, and then injecting it into the target area, which is crucial for achieving optimal results ((Goich & Schachter, 2024)).

The review also emphasizes the role of adipose-derived stem cells (ADSCs) present in the fat grafts, which may contribute positively to the healing and aesthetic

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outcomes of the procedure. This aspect is particularly noteworthy, as it suggests that the biological properties of the grafted tissue could enhance not only the volume but also the quality of the skin and underlying structures, potentially leading to improved aesthetic results over time.

Furthermore, the authors critically evaluate various factors influencing the success of fat grafting, including the timing of the procedure and the techniques used for harvesting and transplanting the fat. They provide insights into the potential benefits and drawbacks of the technique, which is essential for practitioners considering this approach for their patients. The discussion surrounding the timing of grafting is particularly relevant, as it can significantly impact the integration and survival of the grafted tissue, ultimately affecting the aesthetic outcomes.

CONCLUSION

The literature on facial lipografting reveals a multifaceted and evolving understanding of its effects on skin quality and aesthetic outcomes. The historical context provided by the foundational work on autologous fat injection showcases the progression from rudimentary techniques to advanced regenerative therapies. The introduction of innovative methods in the 1990s, particularly those emphasizing the role of adipose-derived stem cells (ADSCs), has underscored the regenerative potential of adipose tissue (MAZZOLA et al., 2011).

Research highlights the dual benefits of facial lipografting, which not only restores volume but also enhances skin rejuvenation and scar treatment through the action of ADSCs (Spiekman et al., 2017). Systematic reviews have confirmed the efficacy of autologous fat grafting in wound healing, attributing its success to the anti-inflammatory and angiogenic properties of ADSCs (Malik et al., 2020). However, variability in outcomes has been noted, emphasizing the need for standardized harvesting and processing techniques to optimize graft viability (Gentile & Garcovich, 2021).

The exploration of adjunctive techniques, such as the use of platelet-rich fibrin (PRF), has shown potential benefits in enhancing graft retention, though evidence

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remains inconclusive (Li et al., 2022). Furthermore, systematic reviews and meta-analyses reveal significant improvements in postoperative outcomes, including skin texture and elasticity, as well as high patient satisfaction rates associated with facial lipografting (Li et al., 2022).

Recent studies have reinforced the importance of ADSCs in improving skin quality and hydration, suggesting that integrating stem cell therapies into fat grafting procedures can yield superior results (Katarzyna Czop & Jałowska, 2023). The application of autologous fat grafting in specific contexts, such as cleft lip deformity repair, further illustrates its versatility and effectiveness in enhancing aesthetic outcomes while minimizing scarring (Goich & Schachter, 2024).

In conclusion, the body of literature collectively underscores the significance of facial lipografting as a transformative technique in both aesthetic and reconstructive surgery. The interplay of innovative procedural techniques, the regenerative potential of adipose tissue, and the ongoing refinement of clinical practices contribute to a deeper understanding of how facial lipografting can enhance skin quality and overall aesthetic outcomes.

DISCLOSURE STATEMENT

- Disclosure Statement : The authors have no conflicts of Interest to declare
- Funding Sources : None
- Acknowledgements : -
- Author Contribution : All authors discussed and contributed the final content for journal submission and publication

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