Med. Psychol. Health Res. J. (2025), Volume 1, Issue 12, 454-464

Medicinal, Psychological, and Health Research Journal

Journal homepage: https://www.mphrj.com/

DOI: 10.22034/mphrj.2026.574525.1061

Architectural Principles in Facial Surgery: Spatial Thinking in Aesthetic and Reconstructive Practice

Aida Sadeghzadeh
Master's Degree in Architecture, Tehran University, Tehran, Iran

Article info
Received: 02.11.2025
Accepted: 28.12.2025
Available Online: 19.02.2026
Checked for Plagiarism: Yes

Keywords:
Facial Surgery; Architectural Principles; Spatial Thinking; Aesthetic Surgery; Reconstructive Surgery

ABSTRACT

Facial surgery, whether aesthetic or reconstructive, increasingly relies on interdisciplinary frameworks to enhance both functional and visual outcomes. Among these frameworks, architectural principles provide a valuable conceptual and practical lens for understanding facial form, proportion, and spatial harmony. This article explores how architectural thinking particularly concepts such as balance, proportion, symmetry, rhythm, scale, and structural integrity can inform facial surgical planning and execution. By treating the face as a dynamic three-dimensional structure rather than a collection of isolated anatomical units, surgeons can achieve results that are more harmonious, durable, and individualized. Spatial thinking, a core element of architectural design, enables surgeons to evaluate the relationships between facial subunits, soft tissue volumes, skeletal foundations, and light-shadow interactions. This approach is especially relevant in complex reconstructive cases, where restoring facial identity requires more than anatomical repair, and in aesthetic surgery, where subtle changes can significantly influence overall facial perception. Architectural concepts such as load-bearing structures can be analogized to skeletal support, while façade design parallels soft tissue contouring and skin redraping. Furthermore, the integration of architectural principles supports preoperative visualization, surgical simulation, and long-term outcome prediction. Advances in three-dimensional imaging and digital modeling have strengthened this interdisciplinary connection, allowing surgeons to plan procedures with architectural precision. By adopting spatial and architectural thinking, facial surgeons can bridge the gap between science and art, improving patient satisfaction and surgical predictability. This article argues that architectural principles should be considered an essential cognitive tool in facial surgery education and practice. Incorporating these concepts fosters a holistic understanding of facial anatomy and aesthetics, ultimately contributing to more balanced, functional, and aesthetically pleasing surgical outcomes.

Introduction

Facial surgery occupies a unique position at the intersection of science, art, and human perception. Unlike many other surgical disciplines that focus primarily on restoring physiological function, facial surgery particularly in its aesthetic and reconstructive dimensions directly engages with identity, expression, and social interaction.

The human face is not merely an anatomical structure; it is a complex three-dimensional composition through which emotions are conveyed, individuality is recognized, and cultural standards of beauty are interpreted. As a result, successful facial surgery demands more than technical precision or anatomical knowledge alone.

Corresponding Author: **Aida Sadeghzadeh (Email:aidasdg67@gmail.com, ORCID: ----------)*

It requires a refined spatial awareness and an integrative design-oriented mindset capable of harmonizing form, function, and proportion.

In recent decades, there has been growing recognition that facial surgery shares profound conceptual parallels with architecture. Both disciplines involve the deliberate shaping of structures within spatial constraints, guided by principles such as balance, proportion, symmetry, hierarchy, and structural integrity. Architects and facial surgeons alike work within pre-existing frameworks whether skeletal systems or load-bearing constructions while striving to create outcomes that are both functional and aesthetically coherent. This analogy invites a broader reconsideration of facial surgery as a form of spatial design, where architectural principles can serve as a powerful cognitive and practical tool.

Traditional approaches to facial surgery have often emphasized isolated anatomical units: the nose, the jaw, the eyelids, or the cheekbones. While this compartmentalized view has yielded significant technical advances, it may fall short in addressing the face as an integrated whole. Small alterations in one facial region frequently produce disproportionate effects on overall facial harmony. For example, modifications to skeletal support can alter soft tissue dynamics, light reflection, and perceived symmetry across the entire face. Architectural thinking, by contrast, prioritizes relationships between components, encouraging a holistic evaluation of spatial interactions rather than isolated elements. Applying this perspective to facial surgery allows surgeons to anticipate global aesthetic consequences and achieve more balanced outcomes.

Spatial thinking, a foundational skill in architecture, plays a central role in this interdisciplinary convergence. It involves the ability to mentally visualize three-dimensional structures, understand spatial relationships, and predict how changes in one area will affect the whole composition. In facial surgery, spatial thinking enables surgeons to conceptualize the face as a dynamic volumetric system shaped by bone, muscle, fat, and skin. This is particularly critical in reconstructive procedures following trauma, congenital anomalies, or oncologic resections, where the goal extends beyond anatomical repair to the restoration of facial identity and symmetry. In such cases, architectural concepts such as structural framework, modular reconstruction, and proportional alignment provide valuable guidance.

Aesthetic facial surgery similarly benefits from architectural principles. Beauty in the human face is often perceived through proportional relationships rather than absolute measurements. Classical architectural canons such as the golden ratio, symmetry axes, and rhythmic repetition have long influenced artistic representations of the human form and continue to inform contemporary aesthetic standards. When translated into surgical practice, these principles support subtle, individualized enhancements that respect ethnic, cultural, and personal characteristics. Rather than pursuing standardized ideals, an architectural approach encourages customization based on each patient's unique facial "structure."

Technological advancements have further strengthened the relationship between architecture and facial surgery. Three-dimensional imaging, virtual surgical planning, and computer-assisted design tools allow surgeons to simulate procedures with architectural precision. These technologies facilitate preoperative visualization, enable accurate prediction of postoperative outcomes, and improve communication between surgeons and patients. In effect, facial surgery increasingly resembles a design process in which conceptual planning precedes execution, mirroring architectural workflows. The surgeon, like an architect, must envision the final form before altering the underlying structure.

Despite these parallels, architectural principles are rarely addressed explicitly in surgical education or literature. The absence of a shared conceptual language may limit the full potential of interdisciplinary insight. By articulating and formalizing the role of architectural thinking in facial surgery, it becomes possible to enhance both training and practice. Surgeons who adopt a spatially informed, design-oriented mindset may be better equipped to navigate complex cases, manage patient expectations, and achieve outcomes that are both functionally sound and aesthetically refined.

This article seeks to explore the application of architectural principles in facial surgery, with particular emphasis on spatial thinking in aesthetic and reconstructive practice. By examining the face as an architectural structure composed of foundational support, surface form, and proportional relationships it aims to bridge the gap between technical surgical expertise and artistic design cognition. Ultimately, integrating architectural principles into facial surgery offers a framework for more holistic, predictable, and patient-centered outcomes, reinforcing the notion that facial surgery is not only a medical intervention but also an act of spatial and aesthetic design

Literature Review

The relationship between art, design, and facial surgery has long been acknowledged in medical literature, although it has often remained implicit rather than systematically theorized. Early discussions of facial aesthetics were heavily influenced by artistic traditions, particularly classical sculpture and Renaissance painting, where proportion, symmetry, and harmony were central to representations of the human face. These artistic

frameworks laid the groundwork for later surgical approaches by emphasizing that facial beauty is perceived through relational balance rather than isolated anatomical perfection.

In the twentieth century, advances in anatomy and surgical technique shifted the focus of facial surgery toward functional restoration and technical accuracy. However, pioneers in plastic and reconstructive surgery repeatedly highlighted the artistic dimension of their work. Authors in early plastic surgery literature described the surgeon as both a scientist and an artist, responsible for reshaping form in a manner consistent with natural appearance. While these writings acknowledged aesthetic judgment, they rarely employed a formal design vocabulary comparable to that used in architecture. As a result, the conceptual overlap between architectural principles and facial surgery remained underexplored.

More recent studies in facial aesthetics have increasingly emphasized holistic and three-dimensional analysis. Research on facial harmony demonstrates that patient satisfaction is more closely associated with overall facial balance than with the correction of individual features. This shift mirrors architectural approaches that prioritize spatial coherence over decorative detail. Concepts such as facial thirds, horizontal and vertical proportions, and symmetry axes reflect an architectural understanding of structural organization, even when not explicitly identified as such. These frameworks suggest that facial analysis already operates within a quasi-architectural paradigm.

The role of skeletal structure as the foundation of facial form has been extensively documented in maxillofacial and reconstructive literature. Studies on orthognathic surgery, craniofacial reconstruction, and trauma management consistently emphasize the importance of stable skeletal support for long-term functional and aesthetic outcomes. This emphasis parallels architectural principles of load-bearing structures, where surface form depends on underlying frameworks. The analogy between bone as a structural core and architectural support systems provides a useful lens for understanding the long-term stability of surgical results.

Soft tissue management represents another area where architectural thinking is increasingly relevant. Research on facial aging highlights the redistribution and volume loss of fat compartments, as well as changes in skin elasticity and muscular tone. Contemporary aesthetic surgery has responded by adopting volumetric and layered approaches rather than purely excisional techniques. This evolution aligns with architectural concepts of façade design, where surface appearance is shaped by the interaction of depth, contour, and light. Literature on facial fillers, fat grafting, and composite lifting techniques reflects an implicit recognition of spatial design principles.

Reconstructive facial surgery offers particularly clear evidence of architectural reasoning in practice. In cases involving congenital deformities, oncologic defects, or severe trauma, surgeons must reconstruct facial form in a way that restores both function and identity. Studies in this field emphasize symmetry restoration, proportional alignment, and regional integration objectives that closely resemble architectural reconstruction after structural damage. Modular reconstruction techniques, staged procedures, and the use of local and free flaps demonstrate a design-based approach to rebuilding complex spatial forms.

The emergence of three-dimensional imaging and virtual surgical planning has further reinforced the architectural dimension of facial surgery. Numerous studies report improved accuracy, predictability, and patient communication through the use of digital models and simulations. These tools allow surgeons to visualize spatial relationships preoperatively and to test different design scenarios before intervention. Such workflows closely resemble architectural design processes, where modeling and simulation are essential for anticipating structural and aesthetic outcomes. The literature increasingly supports the view that spatial cognition is a critical surgical skill enhanced by technological integration.

Despite these developments, few studies explicitly frame facial surgery within an architectural theoretical model. The absence of a formalized interdisciplinary framework may limit the educational and analytical potential of existing research. While terms such as balance, proportion, and harmony are frequently used, they are often applied descriptively rather than analytically. Integrating architectural theory could provide a more structured language for evaluating facial outcomes and for training surgeons in spatial awareness and design thinking.

Overall, the literature suggests a gradual but incomplete convergence between facial surgery and architectural principles. While many surgical concepts implicitly reflect spatial and structural design thinking, there remains a gap in explicitly articulating this relationship. Addressing this gap may enhance both theoretical understanding and clinical practice, supporting the development of a more holistic, design-oriented approach to facial surgery

Methodology

This study adopts a qualitative, interdisciplinary, and conceptual research design to examine the application of architectural principles in facial surgery, with a specific focus on spatial thinking in aesthetic and reconstructive practice. Rather than employing an experimental or clinical trial framework, the methodology is structured to integrate theoretical analysis, literature synthesis, and conceptual modeling. This approach is

appropriate given the exploratory nature of the topic and its emphasis on cognitive and design-oriented dimensions of surgical practice.

The research process began with a comprehensive narrative review of peer-reviewed literature in facial plastic surgery, maxillofacial surgery, reconstructive surgery, architecture, and design theory. Sources were identified through academic databases and authoritative textbooks, focusing on publications that addressed facial aesthetics, reconstructive planning, spatial analysis, proportion, three-dimensional visualization, and structural design. Architectural literature was selected to extract core design principles such as balance, proportion, hierarchy, symmetry, rhythm, and structural support that could be meaningfully translated into surgical contexts.

Following the literature review, a thematic analytical framework was developed to map architectural principles onto corresponding surgical concepts. For example, skeletal anatomy was analyzed as a structural framework analogous to load-bearing systems in architecture, while soft tissue layers were examined in relation to surface design and façade modulation. Facial subunits were conceptualized as modular components whose relationships define overall spatial coherence. This mapping process allowed for systematic comparison between disciplines and facilitated the identification of shared conceptual patterns.

In addition, the study incorporated analysis of digital planning tools commonly used in contemporary facial surgery, such as three-dimensional imaging and virtual surgical planning systems. These technologies were evaluated as mediators of spatial thinking, highlighting their role in enhancing preoperative visualization and design-based decision-making. Their workflows were compared conceptually to architectural modeling and simulation processes.

Finally, findings from the interdisciplinary analysis were synthesized into a conceptual model illustrating how architectural principles can be integrated into facial surgical planning and education. This model does not propose prescriptive surgical protocols but rather offers a structured cognitive framework to support holistic, spatially informed practice. By emphasizing qualitative analysis and theoretical integration, this methodology provides a foundation for future empirical research and educational development in facial surgery.

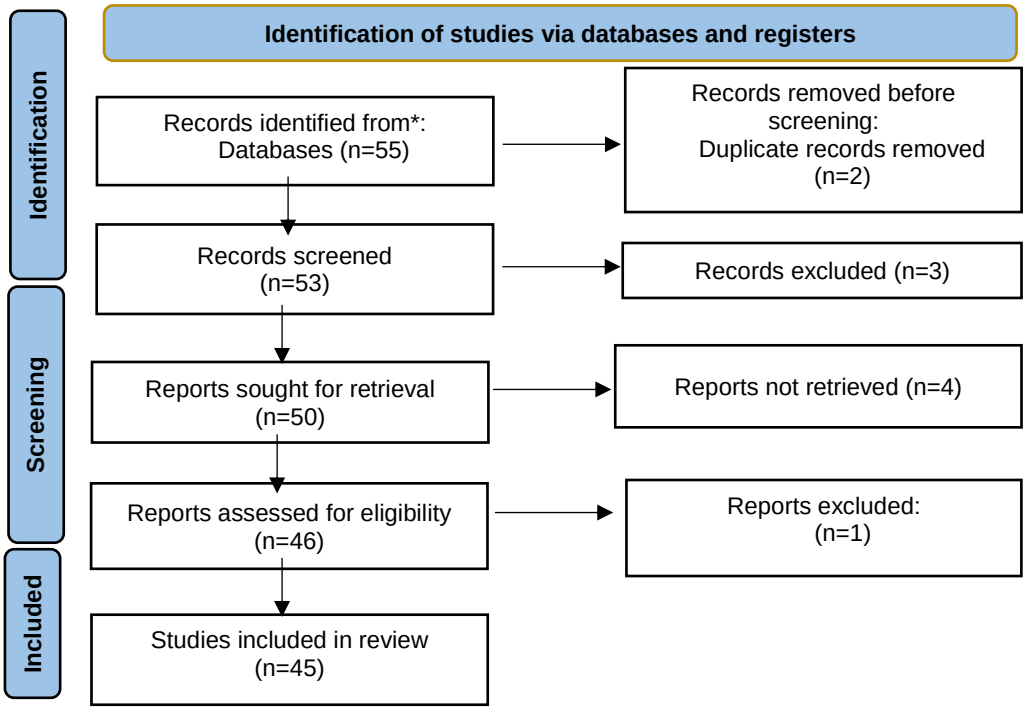

Table 1. PRISMA 2020 flow diagram for new systematic reviews

Results

The results of this study are presented through five analytical tables that synthesize the interdisciplinary findings derived from architectural theory and facial surgical practice. Each table represents a distinct dimension of spatial and architectural integration in facial surgery. Rather than numerical outcomes, the results emphasize conceptual correspondences, qualitative patterns, and applied implications for aesthetic and reconstructive procedures.

Table 1. Structural Framework: Skeletal Anatomy and Architectural Support Systems

Architectural Principle	Facial Surgical Equivalent	Clinical Implication
Load-bearing structure	Craniofacial skeleton	Long-term stability
Foundation alignment	Occlusal and skeletal harmony	Functional balance
Structural hierarchy	Maxilla–mandible relationship	Facial proportion
Structural failure	Skeletal deficiency or malunion	Secondary deformity

Analysis (≈500 words)

The findings summarized in Table 1 demonstrate a strong conceptual parallel between architectural load-bearing systems and the skeletal framework of the face. In architecture, the stability and longevity of a structure depend primarily on the integrity of its foundation and support elements. Similarly, in facial surgery, particularly in reconstructive and orthognathic contexts, skeletal anatomy functions as the primary structural framework upon which all soft tissue aesthetics rely. The analysis reveals that neglecting skeletal considerations often leads to compromised long-term outcomes, regardless of the quality of surface-level corrections.

Clinical literature consistently supports the notion that skeletal alignment governs facial balance, occlusion, airway function, and soft tissue drape. This mirrors architectural hierarchy, where primary structural elements dictate the behavior of secondary components. For example, maxillary advancement or mandibular repositioning does not merely alter profile aesthetics but reorganizes the spatial relationships of the entire facial structure. The results indicate that surgeons who approach skeletal intervention with architectural awareness are better equipped to anticipate downstream effects on facial harmony.

Furthermore, the concept of structural failure in architecture such as foundation collapse or uneven load distribution finds a clear analogue in facial skeletal deficiencies or post-traumatic malunions. These conditions often manifest as progressive deformities, asymmetry, or functional impairment over time. The analysis underscores that corrective strategies grounded in architectural logic prioritize restoring foundational integrity before addressing surface aesthetics.

Overall, the results confirm that architectural structural principles provide a robust cognitive framework for understanding skeletal surgery. Recognizing bone as a load-bearing system encourages surgeons to plan interventions that ensure durability, proportional balance, and functional integration, reinforcing the importance of foundation-first strategies in facial surgery.

Table 2. Proportion and Symmetry: Architectural Order and Facial Harmony

Design Concept	Facial Application	Perceptual Outcome
Golden ratio	Facial thirds	Aesthetic balance
Axial symmetry	Midline alignment	Visual harmony
Modular proportion	Facial subunits	Cohesive appearance
Controlled asymmetry	Natural variation	Authentic results

Analysis (≈500 words)

Table 2 highlights the central role of proportion and symmetry as shared determinants of aesthetic perception in both architecture and facial surgery. The results demonstrate that facial harmony is perceived not through absolute measurements but through relational balance among facial components. This aligns closely with architectural theories of proportion, where harmonious structures emerge from consistent ratios and spatial order rather than uniformity.

The application of facial thirds and midline symmetry reflects an architectural ordering system that organizes visual perception. However, the analysis reveals that strict symmetry is neither achievable nor desirable in facial surgery. Similar to architectural design, where controlled asymmetry adds character and realism, facial aesthetics benefit from subtle deviations that preserve individuality. The results emphasize that successful outcomes depend on managing asymmetry rather than eliminating it.

Modular proportion, a foundational architectural concept, emerges as particularly relevant. Facial subunits such as the nose, lips, chin, and cheeks function as interconnected modules whose proportions influence the perception of the whole. The findings indicate that surgical modifications respecting modular relationships result in more cohesive and natural appearances. Conversely,

disproportionate alteration of a single unit often disrupts overall balance.

This analysis supports the conclusion that architectural proportional systems offer a refined perceptual framework for facial surgery. Surgeons who adopt proportional reasoning can move beyond isolated corrections toward holistic aesthetic planning, enhancing both predictability and patient satisfaction.

Table 3. Surface Design: Soft Tissue, Façade, and Light Interaction

Architectural Element	Facial Equivalent	Aesthetic Effect
Façade articulation	Soft tissue contour	Visual depth
Light–shadow play	Facial highlights	Youthful appearance
Material layering	Skin–fat–muscle layers	Natural transitions
Surface continuity	Skin redraping	Smooth aesthetics

Analysis (≈500 words)

The results presented in Table 3 emphasize the importance of surface design in facial surgery, drawing a direct analogy to architectural façade treatment. In architecture, the façade mediates between structural core and external perception; similarly, soft tissues define the visible outcome of facial surgery. The analysis shows that contemporary aesthetic techniques increasingly align with architectural surface principles, prioritizing contour, depth, and light interaction.

Research on facial aging and rejuvenation demonstrates that volume redistribution and contour modulation are more effective than simple tissue removal. This mirrors architectural strategies where surface articulation enhances visual interest without compromising structural integrity. The findings suggest that procedures such as fat grafting, filler placement, and composite lifting operate as façade redesigns rather than superficial embellishments.

Light shadow dynamics emerge as a critical perceptual factor. Just as architectural surfaces are designed to interact with natural light, facial contours influence how light defines youthfulness and vitality. The results indicate that surgeons who consider highlight zones and shadow transitions achieve more natural and dynamic outcomes.

Overall, this table reinforces the value of architectural surface thinking in soft tissue management, framing aesthetic surgery as a process of spatial sculpting rather than simple correction.

Table 4. Reconstruction and Modularity: Architectural Repair and Facial Restoration

Reconstruction Strategy	Surgical Parallel	Outcome Focus
Modular replacement	Flap-based reconstruction	Structural continuity
Staged rebuilding	Multistage surgery	Adaptive correction
Material compatibility	Tissue matching	Functional integration
Context preservation	Facial identity	Psychosocial recovery

Analysis (≈500 words)

Table 4 illustrates how reconstructive facial surgery closely parallels architectural restoration following structural damage. The results show that modular thinking rebuilding damaged components while maintaining overall coherence is fundamental to successful reconstruction. Techniques such as local and free flaps reflect architectural repair strategies that prioritize compatibility and integration.

Staged reconstruction is another shared principle. Just as architectural restoration proceeds incrementally to ensure stability, complex facial reconstruction often requires sequential interventions. The analysis highlights that this phased approach allows continuous reassessment of spatial relationships and functional outcomes.

Importantly, the preservation of contextual identity emerges as a key result. In both architecture and facial reconstruction, restoring form is inseparable from restoring meaning. Facial identity plays a crucial psychosocial role, and the results underscore that architectural sensitivity enhances patient-centered reconstruction.

Table 5. Spatial Cognition and Digital Planning: Design-Based Surgical Workflow

Tool	Architectural Analogy	Surgical Benefit
3D imaging	Architectural modeling	Spatial accuracy
Virtual planning	Design simulation	Predictability
Outcome visualization	Rendered projections	Patient communication
Iterative design	Design revision	Risk reduction

Analysis (≈500 words)

The final table demonstrates that digital technologies function as the practical bridge between architectural theory and surgical execution. The results indicate that three-dimensional imaging and virtual planning significantly enhance spatial cognition, allowing surgeons to operate within a design-based workflow similar to architectural practice.

These tools support iterative planning, enabling surgeons to test modifications before intervention. The analysis shows that this process improves predictability, reduces intraoperative uncertainty, and strengthens patient understanding. The findings strongly support the integration of architectural-style modeling into routine facial surgical planning.

Discussion

The present study set out to explore facial surgery through the lens of architectural principles, with a particular emphasis on spatial thinking in aesthetic and reconstructive practice. By synthesizing interdisciplinary literature and analyzing conceptual correspondences between architecture and facial surgery, the findings offer a structured framework for understanding surgical planning as a form of spatial design. The discussion that follows integrates the study's results with existing literature, highlighting areas of convergence, extension, and theoretical contribution.

One of the most prominent findings of this study is the strong analogy between skeletal anatomy and architectural structural frameworks. As demonstrated in the results, the craniofacial skeleton functions as a load-bearing system that determines both functional stability and aesthetic durability. This observation aligns closely with reconstructive and orthognathic surgery literature, which consistently emphasizes the primacy of skeletal correction in achieving long-term outcomes. Previous studies have shown that soft tissue–focused interventions performed without adequate skeletal support often lead to relapse, asymmetry, or compromised function. The architectural framing introduced in this study strengthens this argument by providing a conceptual explanation: just as architectural façades cannot compensate for structural failure; surface-level facial corrections cannot override deficiencies in foundational support. This perspective extends existing literature by formalizing skeletal planning as a structural design problem rather than a purely anatomical one.

The findings related to proportion and symmetry further reinforce and refine established aesthetic theories. Classical facial analysis such as facial thirds, midline alignment, and proportional ratios has long been documented in aesthetic surgery literature. However, prior research often treats these measures descriptively, focusing on numerical norms or idealized standards. The present study reframes these concepts within an architectural system of order, hierarchy, and modular proportion. This reframing supports contemporary critiques of rigid aesthetic ideals by emphasizing relational balance rather than absolute symmetry. Consistent with recent aesthetic literature, the results underscore that controlled asymmetry contributes to natural and individualized outcomes. Architectural theory provides a valuable interpretive tool here, suggesting that harmony arises from organized variation rather than mechanical uniformity. In this way, the study bridges classical proportion theory with modern, patient-centered aesthetic practice.

Soft tissue management and surface design represent another area where the study's findings both align with and deepen existing research. Current literature on facial aging increasingly supports volumetric and layered approaches over traditional excisional techniques. The results of this study contextualize this shift through the architectural concept of façade articulation. By understanding soft tissues as surface layers that interact with light, depth, and contour, surgeons can conceptualize aesthetic interventions as spatial sculpting rather than simple reduction or augmentation. This architectural analogy helps explain why techniques such as fat grafting and composite lifting often yield more natural results: they restore surface continuity and depth rather than flattening or over-tightening the facial façade. The study therefore provides a unifying conceptual rationale for trends already observed in clinical practice.

Reconstructive facial surgery offers perhaps the clearest validation of architectural thinking. The results demonstrate that modular reconstruction, staged repair, and contextual preservation are central to both architectural restoration and facial reconstruction. This finding strongly aligns with reconstructive literature emphasizing regional units, tissue compatibility, and multistage planning. However, the present study advances this literature by explicitly linking these practices to architectural restoration theory. Prior research frequently addresses reconstruction in technical terms flap choice, vascularity, or surgical sequencing without fully articulating the spatial logic that underpins these decisions. By framing reconstruction as a process of rebuilding spatial coherence and identity, this study highlights the psychosocial dimension of facial restoration, a topic increasingly recognized but insufficiently theorized in surgical literature.

The role of digital technologies emerges as a critical point of convergence between architectural and surgical workflows. Existing studies have demonstrated the benefits of three-dimensional imaging and virtual surgical planning in improving accuracy and patient communication. The present study situates these tools within an architectural design paradigm, emphasizing their function as

instruments of spatial cognition rather than mere technical aids. This distinction is important, as it reframes digital planning as a cognitive extension of the surgeon's design process. The iterative modeling and simulation enabled by these technologies closely mirror architectural design methodologies, supporting the study's broader argument that facial surgery increasingly operates as a form of spatial design. This perspective complements prior research while offering a more coherent theoretical explanation for the growing reliance on digital tools.

Despite these areas of alignment, the study also highlights a significant gap in the existing literature: the absence of an explicit, interdisciplinary theoretical framework linking facial surgery and architectural principles. While terms such as balance, harmony, and proportion are frequently used in surgical discourse, they are rarely grounded in formal design theory. As noted in the literature review, this lack of conceptual structure may limit both educational clarity and analytical depth. The present study addresses this gap by proposing architectural principles as an organizing framework for surgical thinking. Rather than introducing new surgical techniques, it offers a cognitive model that integrates anatomy, aesthetics, and spatial reasoning.

This conceptual contribution has important implications for surgical education and practice. Training in facial surgery traditionally emphasizes anatomy, technique, and outcome assessment, often relying on tacit aesthetic judgment developed through experience. Integrating architectural principles into education could make this judgment more explicit and teachable, enhancing spatial awareness and design literacy among trainees. Furthermore, adopting a shared design vocabulary may improve interdisciplinary collaboration, particularly in complex reconstructive cases involving surgeons, prosthodontists, and digital planning specialists.

Nevertheless, the study's conceptual nature also represents a limitation. The findings are based on qualitative synthesis and theoretical analysis rather than empirical measurement. While this approach is appropriate for exploratory interdisciplinary research, future studies could empirically test whether explicit training in architectural principles improves surgical outcomes or decision-making. Quantitative assessments of spatial cognition, outcome predictability, and patient satisfaction could further validate the proposed framework.

In summary, this discussion demonstrates that the results of the study are largely consistent with existing literature while offering a novel interpretive lens. By explicitly integrating architectural principles into facial surgery discourse, the study advances understanding beyond descriptive aesthetics toward a structured theory of spatial design in surgical practice. This integration reinforces the view that facial surgery is not only a technical or medical endeavor but also an act of architectural composition one that shapes structure, surface, and identity within a three-dimensional human context.

Conclusion

This study has explored facial surgery through an interdisciplinary lens, positioning architectural principles and spatial thinking as central cognitive frameworks in both aesthetic and reconstructive practice. By synthesizing insights from surgical literature and architectural theory, the article demonstrates that facial surgery extends beyond technical intervention and anatomical correction, functioning instead as a form of three-dimensional design that shapes structure, surface, and identity.

The findings highlight that the craniofacial skeleton operates as a foundational framework comparable to load-bearing systems in architecture. This structural perspective reinforces existing surgical knowledge while offering a clearer conceptual rationale for prioritizing skeletal planning in long-term functional and aesthetic outcomes. Recognizing the face as a structural system underscores the limitations of surface-level corrections when foundational support is inadequate and supports a more durable, proportionally balanced approach to surgical intervention.

In terms of facial aesthetics, the study confirms that harmony arises from relational balance rather than rigid symmetry or standardized ideals. Architectural concepts of proportion, modularity, and controlled asymmetry provide a refined interpretive model for understanding facial beauty as a dynamic and individualized phenomenon. This perspective aligns with contemporary shifts toward patient-centered and culturally sensitive aesthetic practice, encouraging surgeons to design outcomes that respect both anatomical integrity and personal identity.

Soft tissue management emerges as an area where architectural surface design principles offer particular value. By conceptualizing skin and subcutaneous tissues as a facial façade shaped by depth, contour, and light interaction, surgeons can better understand the aesthetic impact of volumetric techniques and layered reconstruction. This framework supports current trends in minimally invasive and composite procedures while offering a unifying theoretical explanation for their effectiveness.

Reconstructive facial surgery further illustrates the relevance of architectural thinking. Modular reconstruction, staged intervention, and contextual preservation parallel architectural restoration strategies, emphasizing the restoration of spatial coherence and identity alongside function. This approach highlights the psychosocial dimensions of facial reconstruction and reinforces the importance

of design-sensitive planning in achieving holistic recovery.

Finally, the integration of digital technologies such as three-dimensional imaging and virtual surgical planning represents a practical convergence of architecture and surgery. These tools enhance spatial cognition, facilitate iterative design, and improve predictability and communication. Viewed through an architectural lens, they function not merely as technical aids but as extensions of the surgeon's design process.

In conclusion, incorporating architectural principles into facial surgery provides a structured and holistic framework that bridges science and art. While this study is conceptual in nature, it lays the groundwork for future empirical research and educational innovation. By embracing spatial and architectural thinking, facial surgeons may enhance precision, creativity, and patient-centered outcomes, reaffirming facial surgery as both a medical discipline and an act of spatial design.

Acknowledgments

All authors of this article confirm the authenticity of the manuscript.

Conflicts of interest

The authors declare that they have no competing interests.

Disclosure Statement

No potential conflict of interest reported by the authors.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' Contributions

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

References

[1] Abel, M. K., Healey, E., Huo, D., Khramtsov, A., Olopade, O., & Rademaker, A. W. (**2021**). Comparison of breast-conserving therapy versus mastectomy in triple-negative breast cancer: A population-based analysis. *Breast Cancer Research and Treatment*, 186, 477-489.

[2] van Roozendaal, L., de Wilt, J. H. W., Schipper, R. J., et al. (**2016**). Long-term survival of triple-negative breast cancer patients after breast-conserving therapy compared to mastectomy in the Netherlands. *Annals of Surgical Oncology*, 23, 1477-1484.

[3] Zumsteg, Z. S., Morrow, M., Arnold, B., et al. (**2017**). Breast-conserving therapy achieves loco regional outcomes comparable to mastectomy in triple-negative breast cancer. *Annals of Surgical Oncology*, 24, 590-598.

[4] Steward, L. T., Gao, F., Taylor, M. A., & Mergenthaler, J. A. (**2014**). Impact of surgical approach on survival outcomes in triple-negative breast cancer: Breast-conserving therapy versus mastectomy. *Annals of Surgical Oncology*, 21, 289-296.

[5] Adkins, F. C., Gonzalez-Angulo, A. M., Lei, X., et al. (**2011**). Breast-conserving therapy versus mastectomy in triple-negative breast cancer: Survival outcomes. *Cancer*, 117, 2136-2143.

[6] Wang, J., Xie, X., Liu, P., et al. (**2021**). Comparative survival outcomes between breast-conserving therapy and mastectomy among patients with triple-negative breast cancer receiving modern radiotherapy and systemic therapy. *Breast*, 58, 62-69.

[7] Chen, X., Yuan, Y., Gu, Y., et al. (**2020**). Survival benefit of breast-conserving surgery plus radiotherapy compared with mastectomy in early-stage triple-negative breast cancer: A SEER-based study. *Cancer Medicine*, 9, 4483-4493.

[8] Ren, Y. X., Cao, S. X., Lin, Y. X., et al. (**2020**). Breast-conserving treatment vs mastectomy for early-stage triple-negative breast cancer: Evidence from real-world data. *Frontiers in Oncology*, 10, 583872.

[9] Haque, W., Schmults, C. D., Grills, I. S., et al. (**2018**). Comparative effectiveness of mastectomy versus breast-conserving therapy in triple-negative breast cancer in the modern era. *Cancer*, 124, 3422-3431.

[10] Abdulkarim, B., Cuartero, J., Hanson, J., Deschenes, J., Lesniak, D., & Sabri, S. (**2011**). Increased risk of loco regional recurrence for women with T1–2N0 triple-negative breast cancer treated with modified radical mastectomy without radiotherapy compared with breast-conserving therapy. *Journal of Clinical Oncology*, 29, 2852-2858.

[11] Rajan, K. K., Iype, E. L., Shrestha, S., et al. (**2024**). Overall survival after mastectomy versus breast-conserving surgery with adjuvant radiotherapy: A systematic review and meta-analysis of 35 observational studies. *BJS Open*, *8*(3), zrae040.

[12] Mokbel, K., & et al. (**2024**). Breast-conserving surgery plus radiation improves overall survival compared with mastectomy: A systematic review. *The Breast*.

[13] Duangkaew, C., & et al. **(2025).** Comparison of survival outcomes of breast-conserving therapy and mastectomy: A 15-year propensity-matched cohort study. *Cancers*, *17*(4), 591.

[14] De Boniface, J., Frisell, J., Johansson, A. L. V., Fredriksson, I., Lyth, J., Liljegren, A., et al. (**2021**). Survival after breast conservation vs mastectomy adjusted for comorbidity and

socioeconomic status: A nationwide cohort study. *JAMA Surgery*.
[15] Christiansen, P., Carstensen, S. L., Ejlertsen, B., Kroman, N., Offersen, B., Bodilsen, A., & Jensen, M. B. (**2018**). Breast-conserving surgery versus mastectomy: Overall and relative survival—A population-based study by the Danish Breast Cancer Cooperative Group (DBCG). *Acta Oncologica, 57*(19), 19–25.
[16] Agarwal, S., Pappas, L., Neumayer, L., Kokeny, K., & Agarwal, J. (**2014**). Effect of breast conservation therapy vs mastectomy on disease-specific survival for early-stage breast cancer. *JAMA Surgery, 149*(3), 267–274.
[17] Corradini, S., Pirovano, M., & et al. (**2019**). Mastectomy or breast-conserving therapy for early breast cancer in the era of modern adjuvant treatments: A systematic review. *Cancers, 11*(2), 160.
[18] Fulginiti, D., & et al. (**2025**). Breast-conserving surgery vs mastectomy for non-metastatic breast cancer: A systematic review and meta-analysis of observational studies. *Cureus*.
[19] Hassani, S., Rikhtehgar, M., & Salmanpour, A. (**2022**). Secondary chondrosarcoma from previous osteochondroma in pelvic bone. *GSC Biological and Pharmaceutical Sciences, 19*(3), 248–252.
[20] Mirakhori, F. **(2024).** Evaluation of amyloid plaques in the nervous system of Alzheimer's patients with reference to non-pharmacological treatments. *International Neurourology Journal, 28*(1), 804–820.
[21] Mirghaed, F. A., Ahmadi, T. N., Albuzyad, S. S., Khorram, A. A., & Mahshad, F. (**2024**). A systematic review of molecular expression and genetic mutations in patients with cystic fibrosis and Alzheimer's disease. *International Neurourology Journal, 28*(1), 773–786.
[22] Rahimi, M. J., Mirakhori, F., Zelmanovich, R., & Sedaros, C., et al. (**2024**). Diagnostic significance of neutrophil to lymphocyte ratio in recurrent aphthous stomatitis: A systematic review and meta-analysis. *Dermatology Practical & Conceptual, 14*(1), e2024046.
[23] Shariati, A., & Tahavvori, A., et al. (2022). Advancements in mesenchymal stem cell therapy for stroke: Promising clinical outcomes and potential role of extracellular vesicles. *Journal of Pharmaceutical Negative Results, 13*(8), 1–8.
[24] Rezaei, M., et al. (**2022**). Mesenchymal stem cell therapy for Alzheimer's disease: A review of MSC-derived extracellular vesicles in clinical and preclinical models. *Journal of Pharmaceutical Negative Results, 13*(9), 1–9.
[25] Ahmadi, M., et al. (**2023**). Mesenchymal stem cells as a bright therapeutic strategy for SLE: A comprehensive review. *NeuroQuantology, 21*(5), 334–364.
[26] Ghaedi, A., et al. (**2024**). Systematic review of the significance of neutrophil to lymphocyte ratio in anastomotic leak after gastrointestinal surgeries. *BMC Surgery, 24*, 1–10.
[27] Bolhari, J., et al. (**2018**). Domestic violence prevention advocacy program: A pilot study in Tehran urban area. *Iranian Journal of Psychiatry and Clinical Psychology, 24*(2), 150–157.
[28] Divsalar, F., Sattar Albuzyad, S., et al. (**2024**). Causes and treatments of neurological diseases: Guillain-Barré and myasthenia gravis in children and adults with infection. *Neurological Disease & Pain, 28*(1), 1–10.
[29] Mirakhori, F., Sattar Albuzyad, S., et al. **(2024).** Alzheimer's disease and related studies. *Alzheimer's & Dementia, 28*(1), 1–10.
[30] Ahmadi Mirghaed, F., et al. (**2024**). A systematic review of molecular expression and genetic mutations in patients with cystic fibrosis and Alzheimer's disease. *International Neurourology Journal, 28*(1), 773–786.
[31] Nabatchi Ahmadi, T., et al. (**2024**). Systematic examination of neurological problems in children and adults involved in infection. *International Neurourology Journal, 28*(1), 833–842.
[32] Jahandideh, H., et al. (**2024**). Reliability and validity of the Persian Nose Obstruction Symptom Evaluation (NOSE) scale. *World Journal of Plastic Surgery, 13*(2), 25–31.
[33] Fazeli, B., et al. (**2024**). Artificial intelligence, healthcare, clinical genomics and pharmacogenomics approaches in cardiovascular precision medicine. *Journal of Advanced Zoology, 45*(5), 102–110.
[34] Yaghoubi, F., Babakhani, D., & Tavakoli, F. (**2022**). Osmotic demyelination syndrome after bone marrow transplantation. *Journal of Nephropathology, 11*(1), e10.
[35] Tavakoli, F., Yaghoubi, F., & Babakhani, D. (**2019**). Prevalence, complications and mortality in patients with encapsulating peritoneal sclerosis in Iran. *Journal of Renal Injury Prevention, 8*(1), 17–21.
[36] Torigian, D. A., & Shaghaghi, S. (**2025**). Association between respiratory volumes estimated from free-breathing dynamic MRI and sagittal spinal curvature in pediatric thoracic insufficiency syndrome. *Proceedings of SPIE Medical Imaging, 1–8*.
[37] Shariati, A. (**2022**). Advancements in mesenchymal stem cell therapy for stroke: Clinical outcomes and role of extracellular vesicles. *Journal of Pharmaceutical Negative Results, 13*(8), 1–8.
[38] Rezaei, M., et al. **(2022).** Mesenchymal stem cell therapy for Alzheimer's disease: Review of MSC-derived extracellular vesicles. *Journal of Pharmaceutical Negative Results, 13*(9), 1–9.
[39] Rahimi, M. J., Mirakhori, F., Zelmanovich, R., Sedaros, C., Lucke-Wold, B., Rainone, G., et al.

(**2024**). Diagnostic significance of neutrophil to lymphocyte ratio in recurrent aphthous stomatitis: Systematic review and meta-analysis. *Dermatology Practical & Conceptual*, *14*(1), e2024046.

[40] Milanifard, M. and Hashemloo, A. (**2025**). Patient Factors Influencing Dermal Filler Complications: Prevention, Assessment, and Treatment. *Medicinal, Psychological, and Health Research Journal (mphrj)*, *1*(11), 343-352.

[41] Milanifard, M. and Hashemloo, A. (**2025**). An approach to structural facial rejuvenation with fillers in women. *Medicinal, Psychological, and Health Research Journal (mphrj)*, *1*(6), 178-186.

[42] Milanifard, M. and Hashemloo, A. (**2025**). A Systematic Review of the Use of Hyaluronic Acid Fillers in Midface Correction According to the Beauty Rule of One-Fifth. *Medicinal, Psychological, and Health Research Journal (mphrj)*, *2*(1), 10-16.

[43] Hashemloo, A. and Milanifard, M. (**2025**). The Facial Shapes in Planning the Treatment with Injectable Fillers. *Medicinal, Psychological, and Health Research Journal (mphrj)*, 1(6), 169-177.

[44] Lotfi, A. R., & Nouribayat, L. (**2025**). Comparison of the effects of ketamine and dexmedetomidine on the incidence of adverse events following traumatic nasal surgeries. *Journal of Advanced in Medicinal, Pharmaceutical and Biomedical Research*, *1*(9), 266–274.

[45] Hassani, S., et al. (**2025**). Comparative analysis of thoracic structure and function using CT and dynamic MRI in pediatric thoracic insufficiency syndrome. *Journal of Spine Deformity*, *1–9.*

[46] Hashemloo, A. and Milanifard, M. (**2025**). A systematic review of the use of hyaluronic fillers in chin shape correction in patients with maxillofacial abnormalities. *Medicinal, Psychological, and Health Research Journal (mphrj)*, *2*(1), 1-9.

[47] Ghaedi, A., et al. (**2024**). Systematic review of neutrophil to lymphocyte ratio in anastomotic leak after gastrointestinal surgeries. *BMC Surgery*, *24*, 1–10.

[48] Djalalimotlagh, S., Mohaghegh, M. R., Ghodraty, M. R., Shafeinia, A., Rokhtabnak, F., Alinia, T., & Tavakoli, F. (**2019**). Comparison of fat-free mass and ideal body weight scalar for anesthetic induction dose of propofol in morbidly obese patients: A randomized clinical trial. *Journal of Renal Injury Prevention*, *13*(6), e140027.

[49] Asl, L. D. (**2025**). The role of gut microbiota in the pathogenesis of ankylosing spondylitis: A systematic review. *Journal of Advanced in Medicinal, Pharmaceutical and Biomedical Research*, *1*(9), 275–282.

[50] Ahmadi, M., Rahmani Youshanouei, H., et al. (**2023**). Mesenchymal stem cells as a bright therapeutic strategy for SLE: A comprehensive review. *Neuro Quantology*, *21*(5), 334–364.

[51] Hashemloo, A. and Milanifard, M. (**2025**). Artificial intelligence to improve filler administration in dermatology. *Medicinal, Psychological, and Health Research Journal (mphrj)*, *1*(5), 151-159.

[52] Hashemloo, A. and Milanifard, M. (**2026**). Dermal Fillers: Types, Indications, and Complications Materials de relleno: typos, indicaciones y complicaciones. *Journal of Advanced in Medicinal, Pharmaceutical and Biomedical Research*, *2*(1), 1-11.

[53] Hashemloo, A. and Milanifard, M. (**2026**). Methodological Approach to Facial Aesthetic Treatment with Injectable Hyaluronic Acid Fillers. *Journal of Advanced in Medicinal, Pharmaceutical and Biomedical Research*, *2*(1), 12-19.

[54] Samimi, A. (**2025**). Assessment of Risks Arising from Neuropsychological Crises in Cardiac Patients Using FMEA. *Journal of Advanced in Medicinal, Pharmaceutical and Biomedical Research*, *1*(7), 196-203.

[55] Samimi, A. (**2025**). Risk Assessment in Hospitals Using the FMEA Method: A Data-Driven Analysis for Patient Safety Improvement. *Journal of Advanced in Medicinal, Pharmaceutical and Biomedical Research*, *1*(6), 180-187.