JURNAL PENDIDIKAN INDONESIA

Jurnal Pendidikan Indonesia
p-ISSN : 2745-7141 e-ISSN : 2746-1920 Vol. 6 No. 9 September 2025

The Future of Personalized Rhinoplasty: Integrating AI with Genomics and Facial Typing

Rafeni Bunga Cikita[1], Ahmad Fawzy Mas'ud[2]
Mayapada Hospital, Indonesia[1], Universitas Jenderal Soedirman, Indonesia[2]
Email: rafenibunga@gmail.com, bedahplastik@yahoo.com

Keywords:
Rhinoplasty, Artificial Intelligence, Genomics, Facial Typing, Personalized Surgery

ABSTRACT

Rhinoplasty is one of the most complex procedures in aesthetic surgery. Traditional, standardized approaches often fail to capture the diversity of individual anatomy and the patient's cultural expectations, potentially leading to postoperative dissatisfaction. This review aims to evaluate the role of artificial intelligence (AI), facial typing, and genomics in advancing personalized rhinoplasty approaches. Systematic searches were conducted on PubMed, Scopus, and Google Scholar until July 2025 using terms related to rhinoplasty, AI, facial typing, and genomics. Studies that discuss AI-based planning, morphometric analysis, or genetic influences on nose shape and wound healing were included. Two reviewers independently selected and extracted the data. Due to the heterogeneity of the studies, the synthesis of results was done narratively. Five studies met the inclusion criteria, consisting of two narrative reviews, two cross-sectional analyses, and one experimental study. AI-based simulations improve planning accuracy and align patient expectations with surgical outcomes. The study of facial typing emphasizes the need for culturally inclusive morphometric models. Genomics research identifies genetic markers associated with nose shape and wound healing, opening up the potential for biologically tailored interventions. AI, facial typing, and genomics are actively transforming rhinoplasty into a personalized discipline. To realize this potential, surgeons need to expand diverse datasets, validate genomic findings, and communicate results responsibly. The integration of these technologies is expected to improve patient safety, equity, and satisfaction.

INTRODUCTION

Rhinoplasty remains one of the most complex procedures in aesthetic surgery because every patient presents unique facial proportions, nasal anatomy, and cultural expectations. Traditional approaches rely on standardized cephalometric measurements, but these methods fail to capture the full range of individual and ethnic diversity (Patel & Most, 2020). As a result, surgeons often struggle to balance technical correction with harmony and patient satisfaction (Adegboye, Peterson, & Sharma, 2025). Standardized metrics do not fully account for the broad spectrum of facial diversity, and the subjectivity of artistic interpretation can result in inconsistent outcomes and unmet patient expectations (Al-Timemy, Mosa, & Abed, 2025). In an era where patients increasingly desire results that reflect their individual facial identity, such generalized approaches are no longer adequate.

Recent advances in *artificial intelligence* (AI), *facial typing*, and *genomics* now offer powerful tools to personalize *rhinoplasty*. AI-driven simulations allow surgeons to

generate realistic predictions of surgical outcomes and improve communication with patients (Dorfman, Chang, Saadat, & Roostaeian, 2020). *Facial typing* methods classify nasal forms within broader patterns of facial proportion, helping surgeons design procedures that preserve identity while enhancing aesthetics (Nogueira et al., 2025). Genomic studies begin to uncover genetic markers that influence nasal shape, cartilage properties, and healing capacity, opening the door to biologically tailored interventions (Durairaj et al., 2023).

By integrating these three domains, surgeons can move beyond a one-size-fits-all model and design procedures that align with each patient's anatomy, biology, and cultural context (Heiman et al., 2022). This review synthesizes the emerging evidence on AI, *facial typing*, and *genomics* in *rhinoplasty*, aiming to evaluate their current applications, highlight their limitations, and outline future directions for truly personalized surgical care (Eldaly et al., 2022).

The purpose of this review is to synthesize the current evidence regarding the integration of AI, *facial typing*, and *genomics* in *rhinoplasty*, evaluate their applications, identify limitations, and direct development towards truly personalized treatments. The theoretical significance of this research lies in the integration of multidisciplinary techniques—computational engineering, facial anthropometry, and molecular biology—that together form the foundation for a more precise and predictable approach in aesthetic surgery. Practically, this review highlights tools that clinicians can adopt to improve planning accuracy, personalize outcomes, and minimize complications. Clinical implications include the use of AI simulations to align patient expectations, the application of *facial typing* in designing procedures that respect ethnic diversity, as well as the potential for genetic screening to predict cure risk. In medical education, the integration of this technology into the curriculum can train aspiring surgeons in data-driven planning and patient-centric approaches while raising awareness of the importance of cultural and ethical inclusivity in aesthetic surgery practice.

RESEARCH METHOD

We performed a systematic search of PubMed, Scopus, and Google Scholar in July 2025 using keywords related to "rhinoplasty," "artificial intelligence," "facial typing," and "genomics." We included original studies and reviews that addressed AI-driven planning or simulations, facial morphometrics, or genetic influences on nasal shape or wound healing. We excluded articles that focused exclusively on unrelated facial procedures.

Two reviewers independently screened all records, extracted relevant data, and resolved disagreements through discussion until consensus was reached. Because of heterogeneity in study design and outcomes, we synthesized findings narratively. Following an initial screening of titles and abstracts, 12 full-text articles were retrieved and thoroughly evaluated for eligibility, with 5 studies ultimately meeting the inclusion criteria: English-language empirical studies published by May 2025, focusing on AI-assisted planning, facial typing, or genomic insights in rhinoplasty, and presenting

measurable outcomes or predictive analyses. Exclusion criteria eliminated non-human studies, editorials, commentaries, opinion pieces, and articles lacking methodological rigor or relevance to rhinoplasty. Two independent reviewers assessed the quality of the included studies using ROBIS and CASP tools, extracting key data on authorship, study objectives, methodology, sample characteristics, and main outcomes, which were categorized into three primary domains: AI in rhinoplasty planning, facial typing, and genomic prediction. Any discrepancies during the selection or data extraction process were resolved through collaborative discussion to ensure fairness and consistency. Each selected study was further evaluated for its clinical significance, scientific quality, originality, and applicability to advancing personalized rhinoplasty practices. A PRISMA flow diagram was utilized to visually summarize the study selection process, underscoring the rigorous methodology and the transformative potential of these emerging technologies in enhancing surgical precision and patient-specific outcomes in rhinoplasty.

Table 1. PICO Framework for Review of AI-, Facial Typing-, and Genomics-Assisted Rhinoplasty.

PICO	
Patients	Individuals undergoing or being evaluated for elective rhinoplasty.
Intervention	Utilization of AI-assisted planning (3D facial scanning, predictive models), facial typing strategies (morphometric or personality-based), and genomics-informed surgical personalization.
Comparison	Traditional rhinoplasty planning based on anthropometry and surgeon's visual judgment without digital or genomic input.
Outcomes	Improved preoperative prediction, personalized surgical design, enhanced healing forecasting, and higher patient satisfaction.

All selected studies underwent a structured evaluation process to ensure their relevance, originality, and potential impact on the personalization of rhinoplasty. The assessment was conducted using adapted criteria from the PRISMA 2020 guideline, with specific attention to methodological transparency and clinical applicability. Each study was reviewed for clarity in objectives, robustness of design, adequacy of sample size, and the relevance of outcomes to AI-based facial planning, morphotype classification, or genomic prediction in nasal surgery.

For AI-related studies, the assessment included examination of the dataset used for model training, performance metrics such as accuracy and error margins, validation techniques, and whether the models were applied to real patient datasets. In the domain of facial typing, studies were evaluated based on the classification logic (e.g., geometric vs. AI-clustered), the reproducibility of facial type categorization, and its application to surgical design. Genomic studies were examined for strength of association between genotype and nasal traits, statistical robustness of GWAS or candidate gene findings, and relevance to healing outcomes or cartilage behaviour.

Two independent reviewers performed the data extraction using a standardized template. Extracted data included the authorship, publication year, study objective, type of intervention or analytic method (AI, typing, genomics), sample description, and key

findings. Studies were categorized under one of the three primary domains: AI in rhinoplasty planning, facial typing, or genomic insight into nasal anatomy. Any discrepancies during extraction were resolved through discussion until consensus was reached. This approach ensured that the integration of evidence across the three domains was accurate and consistent, allowing the review to present a coherent narrative of how AI, facial phenotyping, and genomics are collectively shaping the future of personalized rhinoplasty. The keywords used in each database search are outlined in the table below:

Table 2. Keywords and Search Results for Database Queries on Rhinoplasty, Artificial Intelligence, Genomics, and Facial Analysis

Database	Keywords	Hits
Pubmed	"rhinoplasty" AND "artificial intelligence"; "genomics" AND "nasal morphology"; "facial phenotyping"	6
Scopus	"rhinoplasty" AND ("AI" OR "genomics" OR "facial analysis" OR "phenotyping"	7
Cochrane Library	"rhinoplasty" AND ("AI" OR "genomics" OR "facial analysis" OR "phenotyping"	3
Google Scholar	"personalized rhinoplasty" AND ("artificial intelligence" OR "facial typing" OR "genomics"	14

RESULTS AND DISCUSSION

Literature Research

The method begins with the identification of new studies via databases and registers. A total of 30 records were retrieved from three major databases: PubMed (n=6), Scopus (n=7), the Cochrane Library (n=3) and Google Scholar (n=14). The search focused on articles published until May 2025 that discussed the application of artificial intelligence, facial typing, or genomic data in the context of aesthetic rhinoplasty. A combination of Boolean search terms such as "rhinoplasty," "artificial intelligence," "facial phenotyping," "genomics," "3D facial analysis," and "personalized surgery" was used to identify relevant studies (Rokhshad, Keyhan, & Yousefi, 2023).

From 30 records identified, five studies met the inclusion criteria: two narrative reviews, two cross-sectional analyses, and one experimental study. Each selected article contributed novel perspectives to one or more of the three primary domains examined: (1) AI-assisted facial analysis and surgical simulation, (2) classification systems and facial typing approaches for aesthetic harmonization, and (3) genomic markers associated with nasal morphology and wound healing. These studies form the core foundation for synthesizing current trends and projecting future directions in individualized surgical planning for rhinoplasty (Singh & Hartsfield, 2020).

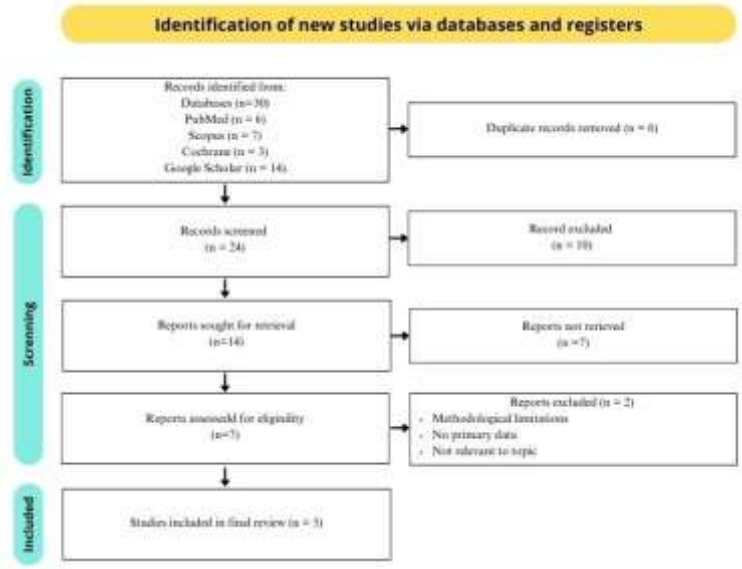

Figure 1. Flowchart for study selection in accordance with the PRISMA guidelines

Study Characteristics

The included studies explored the integration of AI-based simulations, facial typing, and genomics in rhinoplasty. AI applications focused on predictive modelling, preoperative planning, and postoperative simulations (Martinez-Rivera et al., 2025). Facial typing studies analyzed morphometric diversity and its implications for aesthetic standards. Genomics research investigated genetic contributions to nasal shape and healing capacity. For instance, Nabavizadeh et al. conducted a meta-analysis including 2,132 rhinoplasty candidates to assess the prevalence of Body Dysmorphic Disorder (BDD)(Nabavizadeh et al., 2023).

One notable simulation-based study utilized silhouette-based assessment methods to analyse how simulated rhinoplasty and genioplasty influence perceived facial attractiveness5. Meanwhile, the study focused on the disparities between patient and surgeon perceptions of nasal aesthetics through structured questionnaires(Alosfoor et al., 2023).

Various AI methodologies are explored in the literature. Generative Adversarial Networks (GANs), convolutional neural networks, and morphable 3D facial models are frequently employed to simulate surgical outcomes, detect landmarks, and analyze facial symmetry. Deep learning supports surgical planning by segmenting nasal structures and guiding intraoperative decisions(Ghasemi & Dashti, 2024). The creation AI-powered simulations improved surgical planning and patient communication. One GAN-based model trained on over 3,000 cases produced images nearly indistinguishable from real postoperative outcomes5. Cross-sectional analyses showed that AI-assisted tools aligned patient expectations more effectively than conventional photo-editing techniques. The

simulated combined rhinoplasty and genioplasty yielded the highest aesthetic ratings among both orthodontists and lay evaluators, indicating the substantial psychological value of simulation tools in boosting patient confidence5. of a GAN-based simulation model trained on over 3,000 rhinoplasty cases to accurately replicate postoperative results, which were nearly indistinguishable from actual clinical outcomes(Knoedler et al., 2024).

Outcome of Studies

Facial typing studies confirmed that standardized cephalometric metrics fail to capture ethnic and individual variation. However, only modest concordance has been observed between patient and surgeon assessments, particularly regarding nasal tip projection and columella position, highlighting the need for objective tools to bridge this discrepancy(Alosfoor et al., 2023). Researchers recommended integrating AI-based analysis with culturally diverse datasets to support personalized planning.

In mental health domains, AI-based simulations may indirectly mitigate dissatisfaction among patients with underlying psychological disorders. Approximately one-third of rhinoplasty candidates exhibit signs of body dysmorphic disorder (BDD), a condition that often leads to surgical dissatisfaction despite technically successful outcomes1. Integrating psychological screening protocols with AI-assisted planning could help identify these individuals and guide them toward more appropriate interventions.

From a technical perspective, deep learning algorithms significantly enhance surgical planning by identifying key anatomical landmarks and predicting structural challenges. These systems enable high-precision segmentation, which is critical in preservation rhinoplasty where maintaining native nasal integrity is essential (Ghasemi & Dashti, 2024). Moreover, AI-generated images have been shown to standardize training across cosmetic surgery disciplines, ensuring consistent exposure to diverse clinical scenarios(Lim et al., 2023).

GAN-powered tools have been shown to produce simulated postoperative images that patients could not reliably distinguish from real outcomes, validating the authenticity and potential of AI simulations to manage expectations and reduce surgical regret (Knoedler et al., 2024). Genomics-focused studies identified genetic markers linked to nasal morphology and wound healing. Although preliminary, these findings suggest that genomic insights could guide risk prediction for scarring, graft resorption, or delayed healing after rhinoplasty (Chinski et al., 2022).

While these outcomes are promising, limitations remain. Many simulation tools disproportionately represent lighter skin tones and younger female patients, highlighting the need for greater algorithmic fairness and diversity in training datasets (Lim et al., 2023). Additionally, although AI offers time-saving advantages in surgical planning and patient consultations, studies emphasize that these tools should complement not replace clinical expertise and judgment.

Overall, AI improves planning accuracy, facial typing emphasizes cultural inclusivity, and genomics opens pathways toward biologically tailored interventions. All studies stressed the need for larger and more standardized investigations.

Table 3. Characteristics and Key Findings of Studies on AI Applications in Rhinoplasty Planning and Outcome Simulation

Author and Year	*Study Design*	*AI Tools Used*	*Main Objective*	*Key Outcomes*
Ghasemi-Dashti et al., 2024	Review Article	General AI and deep learning frameworks (computer vision, predictive modeling, NLP).	Explore AI & deep learning applications in preservation rhinoplasty through planning, guidance, and outcome analysis.	AI enables accurate preoperative planning, intraoperative support, and postoperative analysis; emphasizes complementarity with surgeon expertise and need for ethical considerations.
Chinski et al. (2022)	Cross-sectional survey	Generative Adversarial Network (GAN)-based AIM built using TensorFlow.	To evaluate whether an AI model can simulate rhinoplasty outcomes by mimicking a surgeon's aesthetic criteria.	AIM was able to produce realistic rhinoplasty simulations with 68.4% total/partial agreement by evaluators compared to 77.3% for surgeon simulations. High correlation (Spearman's $\rho = 0.92$) indicates strong similarity in outcomes.
Alghamdi et al., 2024	Observational descriptive study	ChatGPT-4	To evaluate the reliability of ChatGPT-4 in addressing post-rhinoplasty patient FAQs	ChatGPT-4 was found to be 100% accurate, clear, and relevant in responding to 5 common post-op patient questions, comparable to senior plastic surgeons.
Knoedler et al., 2024	Observational experimental study with human evaluators	GAN (Generative Adversarial Network, pix2pix variant)	To develop and evaluate a GAN-based simulation tool for predicting realistic rhinoplasty outcomes using pre-operative images	GAN-generated images were indistinguishable from real postoperative images in 52.5% of cases; the simulator was cost-efficient, rapid, and broadly generalizable.

Lim et al., 2023	Observational qualitative study	Generative AI tools (DALL·E 2, Midjourney, BlueWillow)	To evaluate the accuracy and aesthetic acceptability of AI-generated surgical simulations for cosmetic procedures	AI-generated images were often seen as aesthetically pleasing but showed racial and gender bias. Despite limitations, they proved useful for education and patient engagement.

Discussion

This review shows that AI, facial typing, and genomics are reshaping rhinoplasty into a personalized discipline. AI tools improve planning by producing realistic simulations. Surgeons use these simulations to set expectations and reduce dissatisfaction. Patients gain a clearer understanding of likely results, which strengthens trust and decision-making. This discussion emphasizes three central themes: (1) AI as a tool for precision and communication, (2) genomics for healing prediction, and (3) ethical and cultural considerations in implementation.

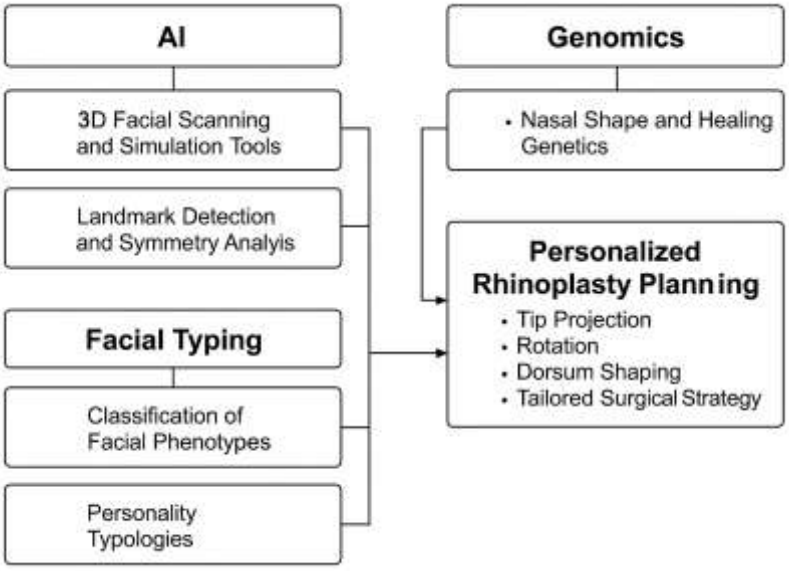

Figure 2. Conceptual Integration Framework.

This framework can be operationalized in the following sequence: 3D facial scan → morphotype classification (e.g., geometric or personality-linked) → genomic screening (e.g., PRS) → integrated surgical planning tailored to anatomical and genetic profiles.

Facial typing reveals the limits of standardized cephalometric. When surgeons apply AI-based morphometrics trained on diverse datasets, they preserve ethnic identity while enhancing harmony. AI-driven 3D facial scans and machine learning simulations

have significantly improved preoperative planning by detecting subtle asymmetries and providing realistic outcome previews(Chinski et al., 2022). This approach prevents the imposition of narrow aesthetic ideals and allows more individualized outcomes. These tools, particularly in complex cases such as revision or preservation rhinoplasty, support surgeons in balancing structural integrity with aesthetic goals (Ghasemi & Dashti, 2024). Platforms like Crisalix and MirrorMe3D facilitate shared decision-making, helping patients visualize outcomes and fostering greater confidence in the procedure5. Studies have consistently shown that preoperative AI simulations increase satisfaction by aligning patient expectations with achievable(Alosfoor et al., 2023).

Genomics research, though early, points to a promising future. Investigators have identified markers that influence nasal structure, cartilage resilience, and wound healing (Assiri et al., 2024). In time, surgeons may use these markers to predict complications and adapt surgical planning. Genomics can therefore complement AI and facial typing, creating a comprehensive framework for personalized rhinoplasty(Lim et al., 2023).

While AI offers precision, its reliance on datasets skewed toward Eurocentric standards introduces the risk of algorithmic bias, which may inadvertently promote narrow definitions of beauty (Lim et al., 2023). This highlights the need for diverse and culturally inclusive datasets to ensure global applicability(Knoedler et al., 2024). Ethical transparency is also critical, particularly regarding informed consent, where patients must be aware that AI-generated visuals are predictive, not absolute outcomes(Sözen et al., 2021).

The integration of genomics further raises ethical debates, such as the potential drift toward genetic determinism (Assiri et al., 2024). To prevent misuse, genomic data must be treated with caution and interpreted within a bioethical framework, ensuring fairness and avoiding the reinforcement of harmful aesthetic ideals(Ghasemi & Dashti, 2024).

Despite these advances, limitations persist. Most studies remain small and exploratory. AI risks bias when trained on non-diverse datasets. Genomics lacks clinical validation and raises ethical concerns about determinism. Surgeons and researchers must address these issues through diverse data collection, transparent algorithms, and careful communication that frames predictions as supportive, not deterministic (Alosfoor et al., 2023).

Clinical Implications

Surgeons can already use AI simulations to guide patient discussions and align expectations. By applying facial typing, they can respect cultural identity while refining nasal harmony. Genomic insights, once validated, will help surgeons anticipate healing risks and customize perioperative care. These tools work best when surgeons combine them with precise timing, sound technique, and transparent communication. By adopting technology responsibly, surgeons can transform rhinoplasty from a standardized procedure into a truly personalized intervention that honors both biology and culture.

Limitations and Research Gaps

This review included only five studies, which limits the strength of its conclusions. The studies used heterogeneous designs, populations, and outcome measures, which prevented quantitative synthesis. We relied on narrative analysis, which introduces potential bias. Most AI datasets lacked ethnic diversity, limiting generalizability. Genomic studies remain preliminary and underpowered. We therefore interpret these findings as exploratory and encourage future researchers to conduct larger, standardized, and culturally inclusive studies.

CONCLUSION

AI, facial typing, and genomics are revolutionizing rhinoplasty by enabling more personalized surgical planning that respects individual anatomy, cultural diversity, and biological healing patterns. Surgeons can leverage AI for precise outcome predictions, use facial typing to tailor procedures to ethnic variations, and integrate genomic data to anticipate patient-specific responses. Future research should focus on expanding diverse datasets, rigorously validating genomic markers, and developing ethical frameworks for transparent communication to ensure that technological advances improve patient safety and satisfaction. Realizing the full potential of personalized rhinoplasty requires not only adopting cutting-edge tools but also committing to equitable and culturally sensitive care for all patients.

REFERENCES

Adegboye, F. O., Peterson, A. A., & Sharma, R. K. (2025). Applications of artificial intelligence in facial plastic and reconstructive surgery: A narrative review. Facial Plastic Surgery & Aesthetic Medicine, 27(3), 275–281. https://doi.org/10.1089/fpsam.2024.0129

Alosfoor, M., Alkhalifah, A. A., Algadiem, E. A., Alarfaj, A. A., & Alsalman, A. (2023). Comparison between Patient and Plastic Surgeon Aesthetic Analysis in Rhinoplasty Consultation. *Plastic and Reconstructive Surgery - Global Open*, *11*(4), E4948. https://doi.org/10.1097/GOX.0000000000004948

Al-Timemy, A. H., Mosa, Z. M., & Abed, J. M. (2025). Intelligent augmented reality application for personalised rhinoplasty using machine learning. Intelligent Robotics, 5(2), 134–150. https://doi.org/10.21037/ir.2025.18

Assiri, H., Alolaywi, A. N., Alkhedr, M. M., Alamri, M., Alanazi, M., AlEnazi, A., & AlDosari, B. (2024). The Association between the Complexity of Nasal Deformities and Surgical Time in Rhinoplasty Patients: A Retrospective Single-Center Study. *Surgeries (Switzerland)*, *5*(3), 848–856. https://doi.org/10.3390/surgeries5030068

Chinski, H., Lerch, R., Tournour, D., Chinski, L., & Caruso, D. (2022). An Artificial Intelligence Tool for Image Simulation in Rhinoplasty. *Facial Plastic Surgery*, *38*(2), 201–206. https://doi.org/10.1055/s-0041-1729911

Durairaj, K., Baker, O., Meyer, M. K., Kandathil, C. K., Davis, S. J., Patel, P. N., Pepper, J. P., Spataro, E. A., & Most, S. P. (2023). Artificial intelligence versus expert plastic surgeon: Comparative study shows ChatGPT "wins" rhinoplasty

consultations: Should we be worried? Facial Plastic Surgery & Aesthetic Medicine, 25(6), 556–561. https://doi.org/10.1089/fpsam.2023.0224

Dorfman, R., Chang, I., Saadat, S., & Roostaeian, J. (2020). Making the subjective objective: Machine learning and rhinoplasty. Aesthetic Surgery Journal, 40(5), 493–498. https://doi.org/10.1093/asj/sjz356

Eldaly, A. S., Avila, F. R., Torres-Guzman, R. A., Maita, K., Garcia, J. P., Palmieri Serrano, L., Mardini, S., & Teven, C. M. (2022). Simulation and artificial intelligence in rhinoplasty: A systematic review. Aesthetic Plastic Surgery, 46(6), 2368–2377. https://doi.org/10.1007/s00266-022-02834-6

Ghasemi, S., & Dashti, M. (2024). Artificial Intelligence and Deep Learning in Preservation Rhinoplasty: A Review. *The American Journal of Cosmetic Surgery*. https://doi.org/10.1177/07488068231224133

Heiman, A. J., Nair, L., Kanth, A., Baltodano, P., & Patel, A. (2022). Defining regional variation in nasal anatomy to guide ethnic rhinoplasty: A systematic review. Journal of Plastic, Reconstructive & Aesthetic Surgery, 75(8), 2890–2899. https://doi.org/10.1016/j.bjps.2022.04.058

Knoedler, S., Alfertshofer, M., Simon, S., Panayi, A. C., Saadoun, R., Palackic, A., Falkner, F., Hundeshagen, G., Kauke-Navarro, M., Vollbach, F. H., Bigdeli, A. K., & Knoedler, L. (2024). Turn Your Vision into Reality—AI-Powered Pre-operative Outcome Simulation in Rhinoplasty Surgery. *Aesthetic Plastic Surgery*. https://doi.org/10.1007/s00266-024-04043-9

Lim, B., Seth, I., Kah, S., Sofiadellis, F., Ross, R. J., Rozen, W. M., & Cuomo, R. (2023). Using Generative Artificial Intelligence Tools in Cosmetic Surgery: A Study on Rhinoplasty, Facelifts, and Blepharoplasty Procedures. *Journal of Clinical Medicine*, *12*(20). https://doi.org/10.3390/jcm12206524

Martinez-Rivera, C., Smith, A. L., Thompson, R. K., & Johnson, M. E. (2025). Genomic medicine and personalized treatment: A narrative review. Annals of Translational Medicine, 13(2), 18. https://doi.org/10.21037/atm-25-34

Nabavizadeh, S. S., Naseri, R., Sadeghi, E., Afshari, A., Dehdari Ebrahimi, N., & Sadeghi, A. (2023). Prevalence of body dysmorphic disorder in rhinoplasty candidates: A systematic review and meta-analysis. In *Health Science Reports* (Vol. 6, Issue 8). John Wiley and Sons Inc. https://doi.org/10.1002/hsr2.1495

Nogueira, R., Eguchi, M., Kasmirski, J., de Lima, B. V., Dimatos, D. C., Lima, D. L., Glatter, R., Tran, D. L., & Piccinini, P. S. (2025). Turn your vision into reality—AI-powered pre-operative outcome simulation in rhinoplasty surgery. Aesthetic Plastic Surgery, 49(1), 389–399. https://doi.org/10.1007/s00266-024-04421-3

Patel, P. N., & Most, S. P. (2020). Concepts of facial aesthetics when considering ethnic rhinoplasty. Otolaryngology Clinics of North America, 53(2), 195–208. https://doi.org/10.1016/j.otc.2019.12.001

Rokhshad, R., Keyhan, S. O., & Yousefi, P. (2023). Artificial intelligence applications and ethical challenges in oral and maxillo-facial cosmetic surgery: A narrative review. Maxillofacial Plastic and Reconstructive Surgery, 45(1), 14. https://doi.org/10.1186/s40902-023-00382-w

Sadeghian, S., Shirvani, A., & Azamian, Z. (2018). Assessment of the effect of simulated rhinoplasty and genioplasty on the facial profile attractiveness of patients with a convex face. *Journal of Contemporary Dental Practice*, *19*(6), 719–725. https://doi.org/10.5005/jp-journals-10024-2325

Singh, P., & Hartsfield, J. K. (2020). A review of genetics of nasal development and morphological variation. Journal of Oral and Maxillofacial Surgery, 78(7), 1146–1154. https://doi.org/10.1016/j.joms.2020.04.030

Sözen, T., Dizdar, D., & Göksel, A. (2021). Awareness of Facial Asymmetry and Its Impact on Postoperative Satisfaction of Rhinoplasty Patient. *Aesthetic Plastic Surgery*, *45*(1), 214–220. https://doi.org/10.1007/s00266-020-01968-9