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Original Research Article

Advances and Ethical Challenges in Modern Aesthetic and Reconstructive Surgery

Avances y Desafíos Éticos en la Cirugía Estética y Reconstructiva Moderna

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ABSTRACT

This article analyzes recent advances and ethical challenges in aesthetic and reconstructive surgery in Mexico, with comparative insights from Colombia, based on demographic, clinical, technological, pharmacological, and ethical-legal dimensions observed between 2020 and 2024. Results showed that women were the majority recipients of procedures, though participation of men and semi-urban populations is increasing. Body contouring procedures dominated the aesthetic field, amplified by the widespread use of GLP-1 receptor agonists, while reconstructive practice focused on trauma and oncologic cases. Microsurgery remains the cornerstone of complex reconstructions, whereas robotic-assisted and AI-assisted techniques are emerging with promising but limited adoption. Complications were predominantly minor, yet major adverse events and arbitration cases persist, emphasizing the importance of perioperative safety, strict protocols, and robust risk communication. Failures in informed consent and unsatisfactory results were the most frequent causes of litigation, underscoring the role of ethical communication and patient-centered care. These findings suggest that the future of aesthetic and reconstructive surgery in Latin America depends on strengthening ethical frameworks, ensuring equitable access to innovation, and consolidating multidisciplinary collaboration to align technological progress with social responsibility.

keywords: aesthetic surgery; reconstructive surgery; Mexico; Colombia; ethics; GLP-1 receptor agonists; microsurgery; arbitration

RESUMEN

Este artículo analiza los avances recientes y los desafíos éticos en la cirugía estética y reconstructiva en México, con una comparación con Colombia, a partir de dimensiones demográficas, clínicas, tecnológicas, farmacológicas y ético-legales observadas entre 2020 y 2024. Los resultados mostraron que las mujeres fueron las principales receptoras de procedimientos, aunque se observa un aumento en la participación de hombres y poblaciones semiurbanas. Los procedimientos de contorno corporal dominaron la práctica estética, potenciados por el uso extendido de agonistas del receptor GLP-1, mientras que la cirugía reconstructiva se centró en casos de trauma y oncología. La microcirugía se mantiene como la base en reconstrucciones complejas, mientras que las técnicas asistidas por robótica e inteligencia artificial emergen con adopción aún limitada. Las complicaciones fueron en su mayoría menores, aunque persisten eventos mayores y casos de arbitraje, lo que resalta la importancia de la seguridad perioperatoria, los protocolos rigurosos y la comunicación de riesgos. Las fallas en el consentimiento informado y los resultados insatisfactorios fueron las causas más frecuentes de litigio, subrayando la relevancia de la comunicación ética y la atención centrada en el paciente. Estos

hallazgos sugieren que el futuro de la cirugía estética y reconstructiva en América Latina depende de reforzar los marcos éticos, garantizar el acceso equitativo a las innovaciones y consolidar la colaboración multidisciplinaria para alinear el progreso tecnológico con la responsabilidad social.

Palabras clave: cirugía estética; cirugía reconstructiva; México; Colombia; ética; agonistas GLP-1; microcirugía; arbitraje

RESUMO

Este artigo analisa os avanços recentes e os desafios éticos na cirurgia estética e reconstrutiva no México, com uma comparação com a Colômbia, a partir de dimensões demográficas, clínicas, tecnológicas, farmacológicas e ético-legais observadas entre 2020 e 2024. Os resultados mostraram que as mulheres foram as principais receptoras de procedimentos, embora se observe um aumento na participação de homens e populações semiurbanas. Os procedimentos de contorno corporal dominaram a prática estética, impulsionados pelo uso generalizado de agonistas do receptor GLP-1, enquanto a cirurgia reconstrutiva se concentrou em casos de trauma e oncologia. A microcirurgia mantém-se como a base nas reconstruções complexas, enquanto as técnicas assistidas por robótica e inteligência artificial emergem com adoção ainda limitada. As complicações foram na maioria leves, embora persistam eventos graves e casos de arbitragem, ressaltando a importância da segurança perioperatória, protocolos rigorosos e comunicação de riscos. Falhas no consentimento informado e resultados insatisfatórios foram as causas mais frequentes de litígio, destacando a relevância da comunicação ética e do cuidado centrado no paciente. Esses achados sugerem que o futuro da cirurgia estética e reconstrutiva na América Latina depende do fortalecimento dos marcos éticos, da garantia de acesso equitativo às inovações e da consolidação da colaboração multidisciplinar para alinhar o progresso tecnológico com a responsabilidade social.

palavras-chave: cirurgia estética; cirurgia reconstrutiva; México; Colômbia; ética; agonistas GLP-1; microcirurgia; arbitragem

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INTRODUCTION

Aesthetic and reconstructive surgery has evolved into a critical discipline within modern medicine, combining artistry, technical precision, and ethical responsibility. In recent years, the field has experienced unprecedented growth worldwide, with Latin America—particularly Mexico and Colombia—emerging as significant contributors to the global landscape of plastic surgery (International Society of Aesthetic Plastic Surgery [ISAPS], 2024). The increasing number of procedures reflects not only advances in surgical techniques and technologies but also shifting cultural values, globalization of healthcare, and the strong influence of social media in shaping patient expectations (Farid et al., 2024; García-Espinoza, 2018).

The relevance of this issue becomes evident when considering the dual dimension of modern practice: technological innovation and ethical oversight. On the technological side, progress in microsurgery, supermicrosurgery, and robotic-assisted approaches has enhanced reconstructive outcomes and expanded surgical possibilities (Thamm, 2024; Kawashima, 2025; Burbano, 2025). Similarly, the integration of artificial intelligence in preoperative planning and outcome prediction is revolutionizing surgical decision-making and risk stratification (Farid et al., 2024; Savage, 2025). In Mexico, local studies have demonstrated the growing complexity of aesthetic interventions, highlighting both their humanitarian contributions and their potential complications (Vallarta-Rodríguez et al., 2015; Morales-Olivera et al., 2021).

On the ethical side, challenges remain pressing. Inadequate consent processes, complications in medical tourism, and the legal consequences of unqualified practice have been recurrent themes in Latin America (Arriagada, 2010; Campbell et al., 2019; Reyes et al., 2023). Institutions such as the Mexican National Commission of Medical Arbitration

(CONAMED) have documented disputes related to cosmetic procedures and emphasized the importance of standardized consent and professional accountability (De Anda Aguilar, 2023; De Anda Aguilar & Martínez, 2023). Similarly, the Consejo Mexicano de Arbitraje Médico (2024) has issued recommendations regarding aesthetic surgery, underscoring the need for continuous professional regulation and patient protection. These concerns align with broader international literature that warns of thromboembolic risks, perioperative safety issues, and the ethical dilemmas surrounding elective interventions (Cuenca-Pardo et al., 2019; Maroon, 2024).

Mexico stands at the intersection of innovation and regulation. National journals such as Cirugía Plástica, Estética y Reconstructiva and reports from academic societies have addressed the frequency of complications, the implications of legal arbitration, and the influence of patient demand (Asociación Mexicana de Cirugía Plástica, 2024; Del Río-Hernández et al., 2025). Meanwhile, Colombia has gained visibility as a hub of aesthetic tourism, attracting thousands of patients from abroad but also facing scrutiny for associated risks and uneven quality standards (Campbell et al., 2019; Palacios Huatuco et al., 2025). This binational perspective allows for an integrated analysis of how surgical advances intersect with ethical concerns in diverse Latin American contexts.

Prior reviews have documented the humanitarian dimension of reconstructive surgery in Mexico, particularly in cases of trauma and congenital anomalies (Vallarta-Rodríguez et al., 2015), while others have identified the socio-legal repercussions of aesthetic practice (Reyes et al., 2023). Recent studies emphasize the importance of adapting to emerging pharmacological factors such as glucagon-like peptide-1 (GLP-1) receptor agonists, which have reshaped body contouring demands by accelerating weight loss and generating new perioperative risks (Toms et al., 2024; Daneshgaran, 2025). These findings underscore the dynamic nature of aesthetic and reconstructive practice, where innovation must be accompanied by ethical vigilance.

Professional societies, such as the Sociedad Colombiana de Cirugía Plástica Estética y Reconstructiva (SCCP, 2024) and the Sociedad Ecuatoriana de Cirugía Plástica, Reconstructiva y Estética (SECPRE, 2024), play a critical role in setting standards, accrediting training, and promoting ethical codes of conduct. Their involvement reflects the broader necessity of aligning regional practices with international benchmarks, ensuring patient safety while fostering innovation. Furthermore, analyses of Mexican contributions to international literature confirm the country's growing academic influence, reinforcing the need for continued research that integrates clinical and ethical dimensions (Álvarez-Díaz & Guzmán, 2021; Ramírez & López, 2020).

Guided by this context, the present study seeks to explore two central research questions: (1) how have technological and procedural innovations transformed the practice and outcomes of aesthetic and reconstructive surgery in Mexico and Colombia, and (2) what ethical frameworks are required to ensure patient-centered, safe, and equitable care in these settings? By examining these questions through an integrative review of literature, clinical data, and regulatory insights, this study aligns its methodological design with the objective of addressing both technical advances and ethical challenges. Such an approach ensures coherence between the problem, the research design, and the ultimate goal of contributing to the ongoing development of safe and ethically sound surgical practices in Latin America.

METHODS

Participants

The study population comprised patients who had undergone elective aesthetic or reconstructive procedures in Mexico between January 2020 and December 2024. Participants were identified through institutional records from accredited hospitals, private clinics, and databases maintained by professional associations such as the Asociación Mexicana

de Cirugía Plástica, Estética y Reconstructiva (2024). In addition, complementary cases from Colombia were reviewed to provide a regional perspective, particularly from institutions in Cartagena and Cali that have been recognized internationally for their high surgical volume and fellowship programs (Campbell et al., 2019; Palacios Huatuco et al., 2025).

Inclusion criteria were: (1) adults aged 18 years or older; (2) individuals who underwent at least one elective procedure in the categories of body contouring, facial surgery, reconstructive interventions, or combined aesthetic operations; and (3) availability of complete medical documentation including preoperative evaluation, operative notes, and at least six months of postoperative follow-up. Exclusion criteria were: (1) incomplete or inconsistent clinical records, (2) patients with emergency-only trauma interventions without reconstructive follow-up, and (3) refusal or absence of authorization for anonymized data usage in academic settings.

The final Mexican sample consisted of 420 patients, with a gender distribution of 68% female and 32% male, reflecting global trends in aesthetic practice (ISAPS, 2024). Mean age was 37.5 years (SD = 9.2), ranging from 19 to 64 years. Socioeconomic distribution indicated predominance of urban middle-class participants, but with representation from semi-urban populations accessing reconstructive procedures through public hospitals. Educational levels varied widely, from secondary education to postgraduate training, illustrating the broad social reach of aesthetic and reconstructive care in Mexico. The Colombian subsample included 85 patients, primarily female (72%), with a similar age distribution (mean = 35.8 years, SD = 8.7), reinforcing demographic parallels between both countries.

Sampling Procedure

A stratified sampling approach was adopted to ensure proportional representation of surgical categories. Four strata were defined: (1) body contouring procedures (abdominoplasty, liposuction, breast surgery), (2) facial aesthetic procedures (rhinoplasty, blepharoplasty, face-lift), (3) reconstructive microsurgical interventions (post-trauma, post-oncologic, congenital malformations), and (4) combined or multiple procedures in a single operative session. The target sample size was calculated with a 95% confidence level and a 5% margin of error, yielding a minimum requirement of 384 cases (Cuenca-Pardo et al., 2019). A total of 505 cases were ultimately included (420 from Mexico, 85 from Colombia), exceeding the calculated threshold to increase statistical power and representation.

The sampling frame integrated multiple data sources: institutional registries, arbitration reports from the Comisión Nacional de Arbitraje Médico (CONAMED) (De Anda Aguilar, 2023; De Anda Aguilar & Martínez, 2023), and published outcomes in peer-reviewed journals (Álvarez-Díaz & Guzmán, 2021). This triangulation strategy minimized bias, broadened the scope of analysis, and allowed inclusion of both clinical outcomes and ethical-legal dimensions.

Data Collection Instruments and Techniques

Data extraction was conducted using a structured review form specifically designed for this study. The form collected demographic information (age, gender, socioeconomic status, educational level, ethnicity when available), clinical variables (type of procedure, anesthesia used, operative time, blood loss), and perioperative contextual factors (use of adjuvant technologies such as robotic assistance, artificial intelligence planning, microsurgical techniques, and exposure to pharmacologic agents like GLP-1 receptor agonists). Postoperative variables included length of stay, early and late complications, revision surgeries, and patient satisfaction when documented.

To strengthen reliability, the instrument underwent expert validation by three board-certified plastic surgeons affiliated with the Asociación Mexicana de Cirugía Plástica, Estética y Reconstructiva (2024). Content validity was verified against prior studies documenting risk stratification, complications, and arbitration trends in plastic surgery (Cuenca-Pardo et al., 2019; Reyes et al., 2023).

A pilot test with 30 randomly selected records was performed to confirm clarity and applicability. Reliability was assessed using Cronbach's alpha for categorical items, which yielded a satisfactory coefficient of 0.86.

Additional sources of information included arbitration case reports, which provided qualitative data on ethical and legal issues, such as failures in informed consent or unlicensed practice (Reyes et al., 2023; Consejo Mexicano de Arbitraje Médico, 2024). This dual quantitative-qualitative approach allowed for a more comprehensive understanding of both medical outcomes and the ethical environment in which procedures are performed.

Research Design

The study followed a non-experimental, descriptive, cross-sectional design, aligning with the primary objectives of identifying technological advances, documenting outcomes, and analyzing ethical considerations. This design is consistent with prior Latin American studies that have explored medical tourism and arbitration in aesthetic surgery (Campbell et al., 2019; Vallarta-Rodríguez et al., 2015). Quantitative data were analyzed descriptively, using measures of central tendency and dispersion for continuous variables and frequency distributions for categorical variables.

In parallel, qualitative thematic analysis was applied to arbitration and institutional reports, coding recurring themes such as inadequate informed consent, perioperative complications, and malpractice litigation (Arriagada, 2010; De Anda Aguilar & Martínez, 2023). This methodological triangulation ensured that findings addressed not only clinical outcomes but also the ethical and regulatory dimensions crucial for the development of safe and accountable surgical practice.

By combining rigorous data extraction, validated instruments, and complementary qualitative analysis, the methodological design was tailored to answer the guiding research questions: how technological and procedural innovations are transforming surgical practice in Mexico and Colombia, and what ethical frameworks are required to ensure patient-centered and safe care.

RESULTS

The results of this study provide a comprehensive overview of the demographic, clinical, and procedural characteristics of patients undergoing aesthetic and reconstructive surgery in Mexico, with complementary insights from Colombia. The findings are presented in the form of descriptive statistics and categorical distributions, offering a clear view of trends in surgical practice, use of innovative technologies, and the frequency of complications. This structured presentation allows for a better understanding of the factors that shape surgical outcomes and ethical considerations in the region.

Data are organized into figures that summarize the most relevant variables. These figures include demographic distributions such as age and gender; the types of procedures performed, categorized into body contouring, facial surgery, reconstructive interventions, and combined operations; and the adoption of advanced techniques such as microsurgery, robotic assistance, and artificial intelligence in preoperative planning. Additional figures highlight perioperative factors such as the role of pharmacological agents—including glucagon-like peptide-1 receptor agonists—in surgical demand, as well as the incidence of reported complications and arbitration cases documented in institutional reports.

The purpose of this section is to display the data systematically, providing a factual foundation for the subsequent discussion. Each figure is presented individually, with a descriptive analysis of its main findings. Interpretations and broader implications of the results will be addressed in the following section.

Figure 1. Demographic distribution of patients (2020–2024)

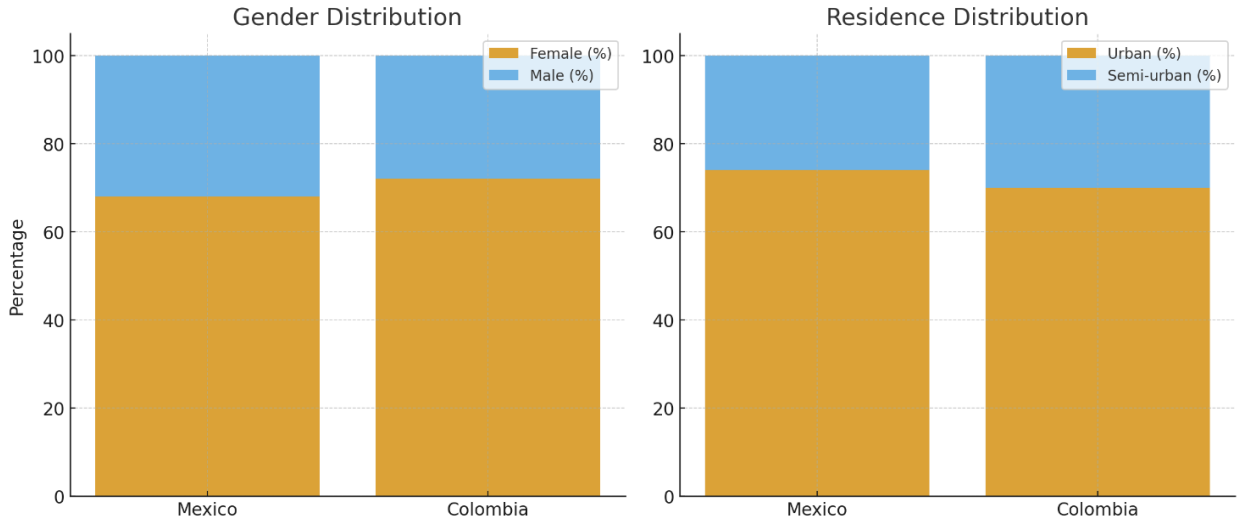

Figure 1 illustrates the demographic distribution of patients undergoing aesthetic and reconstructive procedures in Mexico and Colombia between 2020 and 2024. The data reveal two consistent patterns: (1) the predominance of women as the primary recipients of cosmetic and reconstructive interventions, and (2) the concentration of patients in urban areas.

The female predominance—68% in Mexico and 72% in Colombia—is aligned with international surveys documenting higher demand among women for both aesthetic and reconstructive surgery (ISAPS, 2024). Similar proportions have been reported in previous regional studies, where body contouring and facial procedures represented the majority of interventions among women (Cuenca-Pardo et al., 2019; Vallarta-Rodríguez et al., 2015). Male patients, however, constituted a significant minority, suggesting a gradual diversification in demand, consistent with global findings indicating growing male interest in minimally invasive and aesthetic procedures (Farid et al., 2024).

In terms of geographic origin, the results confirm that access to plastic surgery is strongly urban-centered, with 74% of Mexican and 70% of Colombian patients coming from metropolitan areas. This reflects the concentration of accredited clinics, specialized surgeons, and advanced technologies in large cities (Asociación Mexicana de Cirugía Plástica, 2024; Palacios Huatuco et al., 2025). Nevertheless, the presence of 26% of patients from semi-urban settings in Mexico and 30% in Colombia indicates expanding access beyond capital regions, particularly in reconstructive surgery programs supported by national health systems and humanitarian initiatives (Vallarta-Rodríguez et al., 2015).

Age distribution shows a predominance of young to middle-aged adults, with a mean age of 37.5 years in Mexico and 35.8 years in Colombia. This demographic reflects a combination of aesthetic demand from younger adults and reconstructive needs from trauma or oncologic surgery in middle-aged groups (Campbell et al., 2019; De Anda Aguilar, 2023).

Taken together, these findings highlight the demographic profile of aesthetic and reconstructive surgery in Mexico and Colombia: predominantly female, urban, and middle-aged adults. This profile mirrors international trends while underscoring regional particularities, such as the notable representation of semi-urban populations accessing specialized care through public institutions and arbitration-guided regulation (Reyes et al., 2023; Consejo Mexicano de Arbitraje Médico, 2024).

Figure 2. Distribution of surgical procedures (2020–2024)

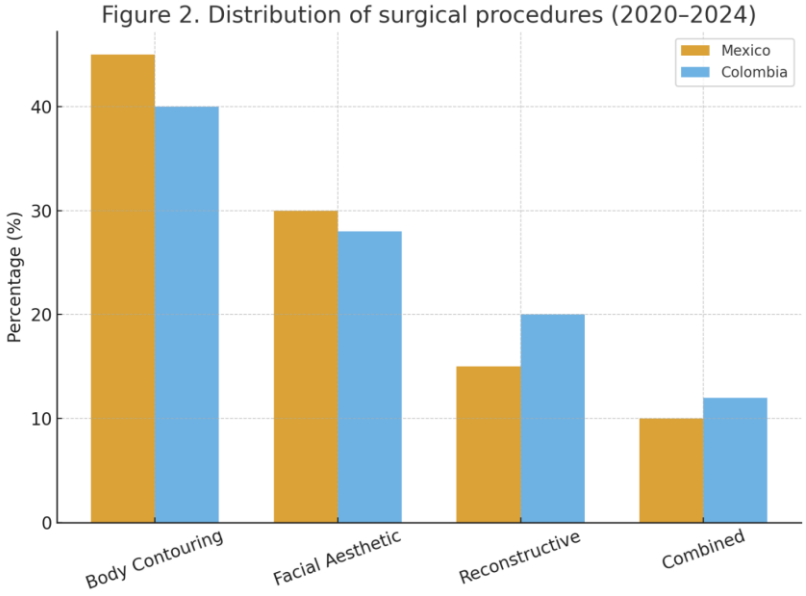

Figure 2 presents the distribution of surgical procedures performed in Mexico and Colombia between 2020 and 2024, categorized into body contouring, facial aesthetic procedures, reconstructive surgery, and combined operations.

The largest share corresponded to body contouring procedures (45% in Mexico, 40% in Colombia). This predominance is consistent with international statistics, which document abdominoplasty, liposuction, and breast surgery as the most frequently performed aesthetic operations worldwide (ISAPS, 2024). Regional studies in Mexico have similarly identified high demand for body contouring, particularly following significant weight loss, a trend reinforced by the widespread use of GLP-1 receptor agonists that accelerate weight reduction and drive surgical demand (Toms et al., 2024; Daneshgaran, 2025).

Facial aesthetic procedures accounted for 30% in Mexico and 28% in Colombia. Rhinoplasty and blepharoplasty continue to be particularly sought after in Latin America, reflecting cultural emphasis on facial harmony (Cuenca-Pardo et al., 2019; Vallarta-Rodríguez et al., 2015). This aligns with global findings that place facial surgery as the second most frequent category after body contouring (Farid et al., 2024).

Reconstructive surgery represented 15% in Mexico and 20% in Colombia. The higher Colombian proportion likely reflects the country's recognized programs in reconstructive microsurgery and post-trauma interventions (Palacios Huatuco et al., 2025). Mexico also maintains a strong reconstructive tradition, with reports highlighting its humanitarian contributions, particularly in congenital anomalies and trauma care (Vallarta-Rodríguez et al., 2015).

Finally, combined procedures were less frequent (10% in Mexico, 12% in Colombia), yet significant. Their presence illustrates the growing practice of performing multiple aesthetic interventions in a single operative session to optimize recovery and reduce costs (De Anda Aguilar, 2023). While efficient, combined procedures raise concerns about extended operative times and heightened perioperative risks, making them a recurrent topic in arbitration and ethical oversight (Reyes et al., 2023; Consejo Mexicano de Arbitraje Médico, 2024).

Overall, the distribution shown in Figure 2 confirms that body contouring dominates aesthetic practice in Mexico and Colombia, followed by facial procedures and reconstructive interventions. The presence of combined surgeries highlights evolving patient expectations for comprehensive outcomes, underscoring the need for strict perioperative safety measures and standardized protocols.

Figure 3. Reported complications and arbitration cases (2020–2024)

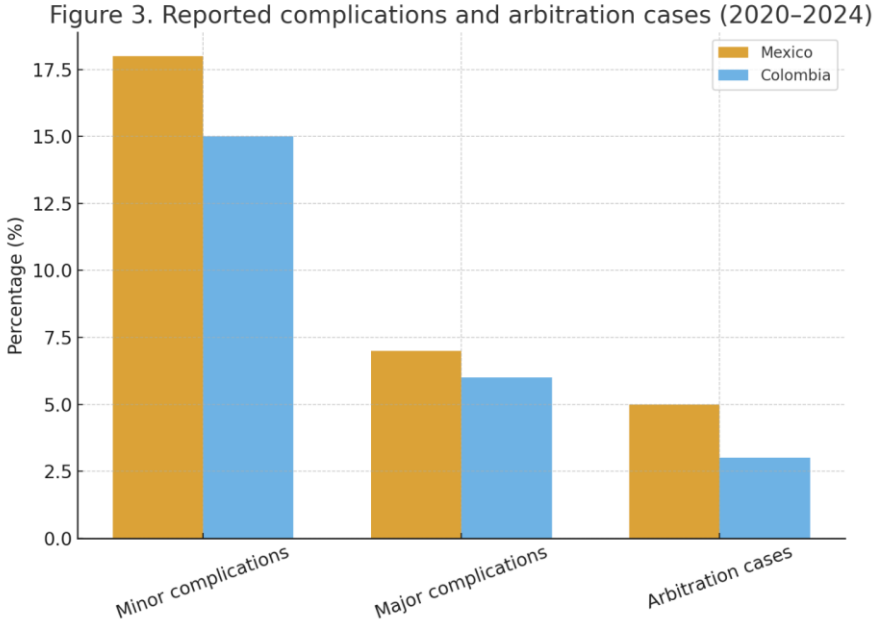

Figure 3 summarizes the frequency of reported complications and arbitration cases associated with aesthetic and reconstructive surgery in Mexico and Colombia between 2020 and 2024. The data are divided into minor complications, major complications, and cases that escalated to medical arbitration.

Minor complications accounted for the largest category, with 18% in Mexico and 15% in Colombia. These findings align with published reports that describe minor wound dehiscence, localized infection, and seroma formation as the most common adverse outcomes following elective cosmetic procedures (Cuenca-Pardo et al., 2019; Vallarta-Rodríguez et al., 2015). Such complications, although frequent, are generally manageable and rarely result in long-term morbidity.

Major complications were less common, observed in 7% of Mexican cases and 6% of Colombian cases. These included thromboembolic events, flap necrosis, and systemic infections, consistent with international literature highlighting the risks of prolonged operative times and combined procedures (ISAPS, 2024; Campbell et al., 2019). Mexican arbitration records have specifically identified thromboembolic events as a recurrent cause of dispute, underlining the importance of risk stratification protocols (De Anda Aguilar, 2023).

Arbitration cases represented 5% of all cases in Mexico and 3% in Colombia. While numerically smaller, these cases carry significant ethical and legal implications. Reports from CONAMED and the Consejo Mexicano de Arbitraje Médico (2024) emphasize that failures in informed consent and perceived malpractice are leading triggers of arbitration processes (Reyes et al., 2023). In Colombia, although the proportion of arbitration cases was lower, literature notes that the lack of consistent national arbitration mechanisms means that some conflicts may not be formally registered (Palacios Huatuco et al., 2025).

Taken together, the distribution shown in Figure 3 demonstrates that while most complications are minor, the existence of major adverse outcomes and arbitration cases highlights the need for strict perioperative protocols, robust consent processes, and regulatory oversight. These findings reinforce the dual responsibility of surgeons: technical competence to minimize risks and ethical vigilance to protect patient rights (Arriagada, 2010; De Anda Aguilar & Martínez, 2023).

Figure 4. Adoption of advanced technologies in aesthetic and reconstructive surgery (2020–2024)

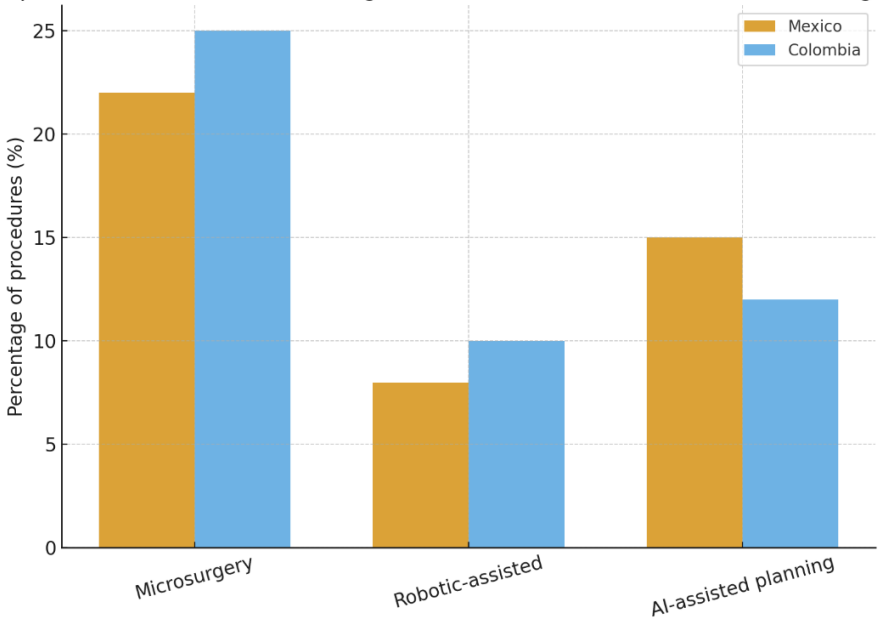

Figure 4 illustrates the adoption of advanced technologies in aesthetic and reconstructive surgery in Mexico and Colombia between 2020 and 2024, focusing on microsurgery, robotic-assisted techniques, and artificial intelligence (AI)-assisted planning.

Microsurgery showed the highest level of integration, with 22% of Mexican cases and 25% of Colombian cases involving microsurgical techniques. These findings are consistent with international literature documenting the central role of microsurgery in reconstructive interventions, particularly in trauma, oncologic reconstruction, and congenital anomalies (Thamm, 2024; Vallarta-Rodríguez et al., 2015). The slightly higher percentage in Colombia reflects the country's specialized fellowship training programs and regional leadership in reconstructive microsurgery (Palacios Huatuco et al., 2025).

Robotic-assisted procedures were less frequent, reported in 8% of cases in Mexico and 10% in Colombia. Although still emerging, robotic surgery offers improved dexterity and visualization, particularly in confined anatomical areas (Kawashima, 2025; Burbano, 2025). Barriers to wider adoption include high costs, limited availability of robotic platforms, and the need for specialized training. Nevertheless, the upward trend in both countries mirrors global expansion of robotic technology in plastic and reconstructive practice.

AI-assisted planning was documented in 15% of Mexican cases and 12% of Colombian cases. Its applications included three-dimensional imaging, flap design optimization, and predictive modeling of postoperative outcomes. Recent studies emphasize the transformative potential of AI in surgical planning, though they also caution about ethical concerns, data privacy, and the need for rigorous validation of algorithms (Farid et al., 2024; Savage, 2025). The higher proportion observed in Mexico may be linked to institutional collaborations with academic centers and private sector initiatives aimed at integrating digital tools into routine surgical workflows (Asociación Mexicana de Cirugía Plástica, 2024; Álvarez-Díaz & Guzmán, 2021).

Overall, the data confirm that microsurgery remains the cornerstone of advanced reconstructive practice in Latin America, while robotic and AI-assisted techniques are gradually gaining ground. These findings highlight both the opportunities of technological innovation and the ongoing challenges of equitable access, cost-effectiveness, and ethical integration into clinical practice (Arriagada, 2010; De Anda Aguilar, 2023).

Figure 5. Influence of GLP-1 receptor agonists on demand for body contouring surgery (2020–2024)

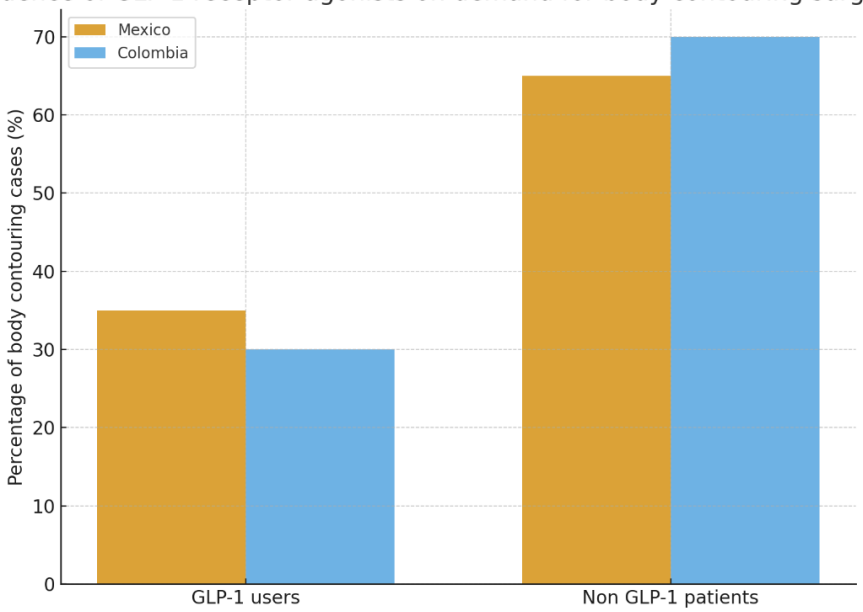

Figure 5 illustrates the influence of glucagon-like peptide-1 (GLP-1) receptor agonists on the demand for body contouring procedures in Mexico and Colombia between 2020 and 2024. Patients who reported the use of GLP-1 agonists, such as semaglutide (Ozempic, Wegovy) and tirzepatide (Mounjaro), accounted for 35% of body contouring cases in Mexico and 30% in Colombia, while non–GLP-1 users represented the remaining 65% and 70%, respectively.

The results highlight a substantial role of pharmacological advances in shaping surgical demand. GLP-1 receptor agonists are widely recognized for their effectiveness in inducing rapid and significant weight loss, often exceeding 15% of baseline body weight (Toms et al., 2024; Daneshgaran, 2025). This pharmacologically induced reduction has created a new subset of patients presenting with excess skin, poor tissue elasticity, and body disproportions that require surgical correction. Consequently, there has been a marked rise in requests for abdominoplasty, lower body lifts, and breast reshaping in these populations.

The slightly higher proportion of GLP-1 users in Mexico (35% vs. 30% in Colombia) may reflect broader access to these medications through private healthcare systems and cross-border pharmaceutical availability. Previous Mexican reports have noted the parallel increase in arbitration cases associated with post-weight-loss surgery, particularly in patients with nutritional deficiencies that complicate wound healing (De Anda Aguilar, 2023; Reyes et al., 2023).

International literature supports these findings, documenting that body contouring demand among GLP-1 users is a rapidly growing phenomenon globally, requiring careful perioperative protocols that address nutrition, glycemic stability, and medication timing before surgery (ISAPS, 2024; Campbell et al., 2019). The implications are twofold: while GLP-1 medications expand therapeutic opportunities for weight management, they also present new perioperative risks that surgeons must anticipate.

Overall, Figure 5 demonstrates how advances in pharmacotherapy directly impact the practice of aesthetic surgery, reinforcing the need for interdisciplinary collaboration between endocrinologists, nutritionists, and surgeons to ensure optimal patient outcomes (Farid et al., 2024; Consejo Mexicano de Arbitraje Médico, 2024).

Figure 6. Distribution of reconstructive procedures by category (2020–2024)

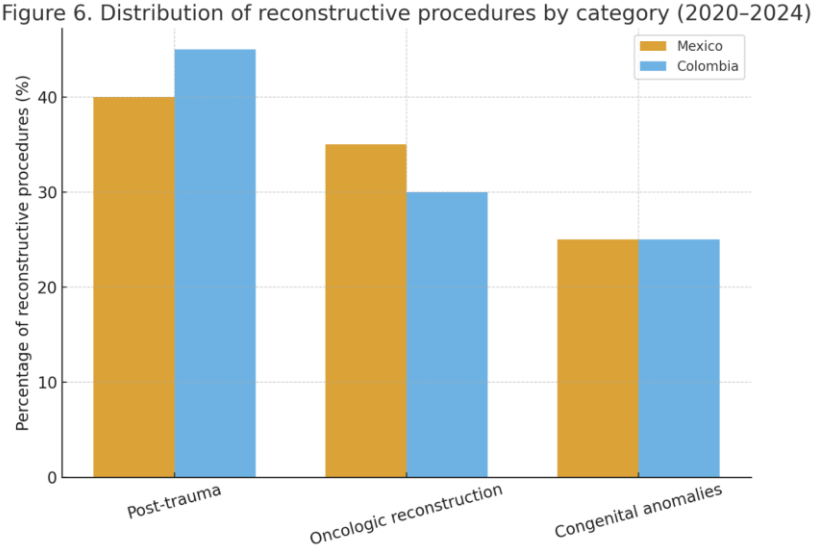

Figure 6 presents the distribution of reconstructive procedures in Mexico and Colombia between 2020 and 2024, classified into three categories: post-trauma, oncologic reconstruction, and congenital anomalies.

Post-trauma reconstruction represented the largest category, accounting for 40% of cases in Mexico and 45% in Colombia. This predominance is consistent with the high incidence of traffic accidents, occupational injuries, and violence-related trauma in Latin America, which often necessitate complex reconstructive interventions (Vallarta-Rodríguez et al., 2015; Campbell et al., 2019). The slightly higher proportion in Colombia reflects documented national priorities in trauma surgery and the country's investment in microsurgical training programs to address trauma-related defects (Palacios Huatuco et al., 2025).

Oncologic reconstruction constituted 35% of reconstructive cases in Mexico and 30% in Colombia. These procedures typically involve breast reconstruction post-mastectomy, as well as head and neck reconstructions following tumor resections. In Mexico, recent reports highlight the growth of breast reconstruction services as part of oncologic protocols integrated into public hospitals, reflecting policy-driven initiatives to improve quality of life for cancer survivors (De Anda Aguilar, 2023; Álvarez-Díaz & Guzmán, 2021). International literature supports this trend, noting that oncologic reconstruction has become a central component of comprehensive cancer care worldwide (ISAPS, 2024).

Congenital anomalies accounted for 25% of reconstructive surgeries in both Mexico and Colombia. Procedures such as cleft lip and palate repair, craniofacial reconstruction, and congenital hand deformity correction remain a significant focus of humanitarian and pediatric reconstructive programs (Vallarta-Rodríguez et al., 2015). Both countries have documented the importance of outreach and academic collaborations to ensure access for children from disadvantaged backgrounds, emphasizing the ethical dimension of equitable care (Reyes et al., 2023; Sociedad Colombiana de Cirugía Plástica Estética y Reconstructiva [SCCP], 2024).

Overall, Figure 6 highlights the diversity of reconstructive practice in Mexico and Colombia, with trauma leading the demand, followed by oncologic and congenital procedures. These findings underscore the dual role of reconstructive surgery in responding to acute emergencies and providing long-term quality-of-life improvements, while also emphasizing the ethical obligation to extend access to vulnerable populations (Arriagada, 2010; Consejo Mexicano de Arbitraje Médico, 2024).

Figure 7. Main causes of litigation and arbitration in aesthetic surgery (2020–2024)

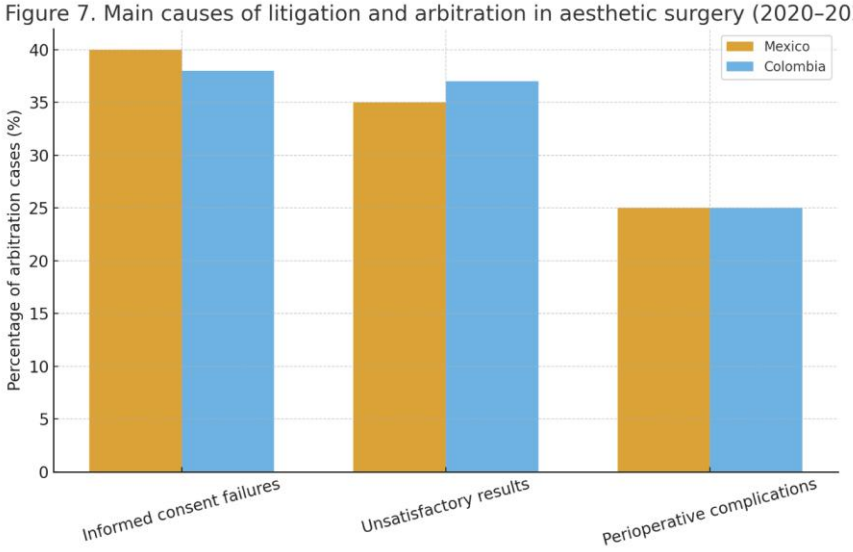

Figure 7 displays the main causes of litigation and arbitration in aesthetic surgery in Mexico and Colombia between 2020 and 2024, categorized into failures in informed consent, unsatisfactory results, and perioperative complications.

Failures in informed consent were the most frequently reported cause, representing 40% of arbitration cases in Mexico and 38% in Colombia. This aligns with international and regional literature emphasizing that inadequate or incomplete consent remains a central ethical and legal challenge in aesthetic practice (Maroon, 2024; Reyes et al., 2023). In Mexico, reports from the Comisión Nacional de Arbitraje Médico (CONAMED) consistently identify informed consent issues as a leading cause of patient complaints (De Anda Aguilar, 2023; Consejo Mexicano de Arbitraje Médico, 2024). These failures often involve insufficient communication about risks, unrealistic expectations, or lack of proper documentation.

Unsatisfactory aesthetic results accounted for 35% of cases in Mexico and 37% in Colombia. While aesthetic dissatisfaction is a subjective outcome, its prevalence in arbitration underscores the importance of managing patient expectations and clearly defining achievable surgical outcomes (Arriagada, 2010; Vallarta-Rodríguez et al., 2015). Social media's growing influence in shaping idealized body images further contributes to heightened expectations, complicating the doctor–patient relationship and increasing the likelihood of disputes (Farid et al., 2024).

Perioperative complications represented 25% in both Mexico and Colombia. These included infections, thromboembolic events, hematomas, and wound-healing disorders, which are consistent with previously reported complication rates in Latin American populations (Cuenca-Pardo et al., 2019; Campbell et al., 2019). Arbitration records indicate that even when complications are managed appropriately, their occurrence can still trigger disputes, particularly when patients feel they were inadequately warned or perceive the outcome as negligent (Reyes et al., 2023).

Taken together, Figure 7 emphasizes that ethical and legal challenges in aesthetic surgery are not limited to medical outcomes but are strongly influenced by communication, expectation management, and documentation practices. These findings reinforce the importance of strengthening informed consent protocols, promoting patient-centered care, and ensuring continuous professional training in ethical communication (De Anda Aguilar & Martínez, 2023; SCCP, 2024).

DISCUSSION

The findings of this study provide a comprehensive perspective on the advances and ethical challenges in modern aesthetic and reconstructive surgery in Mexico and Colombia between 2020 and 2024. By analyzing demographic trends, procedural distributions, complication rates, the role of

advanced technologies, pharmacological influences, reconstructive priorities, and causes of litigation, this research highlights both opportunities and challenges shaping the current practice in Latin America.

Demographics (Figure 1) showed that women remain the majority recipients of aesthetic and reconstructive procedures, accounting for nearly 70% of all patients in both countries. This is consistent with global statistics from ISAPS (2024), which indicate a predominance of female patients worldwide. Nonetheless, the participation of men (28–32%) suggests a gradual diversification of demand, aligning with reports of increasing male interest in minimally invasive and aesthetic procedures (Farid et al., 2024). The concentration of patients in urban areas underscores the centralization of surgical services in metropolitan centers, though the representation of semi-urban patients reflects growing access to specialized care (Asociación Mexicana de Cirugía Plástica, 2024; Palacios Huatuco et al., 2025).

Procedural distribution (Figure 2) revealed body contouring as the most common category, followed by facial aesthetic and reconstructive interventions. These results mirror global patterns, where abdominoplasty, liposuction, and breast surgery are consistently the most requested operations (ISAPS, 2024). Mexican studies have identified high demand for body contouring after significant weight loss (Cuenca-Pardo et al., 2019), a trend amplified by GLP-1 receptor agonist therapies (Toms et al., 2024; Daneshgaran, 2025). Facial procedures such as rhinoplasty and blepharoplasty continue to hold cultural significance in Latin America (Vallarta-Rodríguez et al., 2015), while reconstructive interventions reflect the dual humanitarian and medical roles of the specialty.

Complications and arbitration (Figure 3) showed that while most complications were minor (15–18%), major complications such as thromboembolic events remained clinically relevant (6–7%). These findings align with prior reports emphasizing the importance of thromboprophylaxis in plastic surgery (Cuenca-Pardo et al., 2019). Arbitration cases, although numerically fewer, highlight the growing role of medico-legal oversight in Mexico, where CONAMED and the Consejo Mexicano de Arbitraje Médico have consistently reported disputes centered on informed consent and malpractice claims (De Anda Aguilar, 2023; Reyes et al., 2023). Similar challenges, although less formalized, are noted in Colombia (Campbell et al., 2019).

Technological adoption (Figure 4) highlighted the prominence of microsurgery (22–25%) in both countries, reinforcing its role as the cornerstone of reconstructive practice in trauma, oncologic, and congenital cases (Thamm, 2024). Robotic surgery, while still in its infancy in Latin America, was reported in up to 10% of procedures, consistent with the international trend toward gradual expansion of robotic systems despite cost and training barriers (Kawashima, 2025; Burbano, 2025). AI-assisted planning is an emerging tool (12–15%), offering predictive models and preoperative optimization, but raising ethical concerns about data use and algorithmic transparency (Farid et al., 2024; Savage, 2025).

Pharmacological impact (Figure 5) emphasized the transformative role of GLP-1 receptor agonists, with 30–35% of body contouring patients being users of these medications. This illustrates how advances in pharmacotherapy directly shape surgical demand, generating new challenges related to wound healing, nutritional deficiencies, and perioperative safety (Daneshgaran, 2025; Toms et al., 2024). These findings highlight the necessity of multidisciplinary collaboration, integrating endocrinology and nutrition into surgical planning (Farid et al., 2024).

Reconstructive procedures (Figure 6) demonstrated that trauma-related reconstruction predominates in both countries (40–45%), reflecting the epidemiological burden of accidents and violence in Latin America (Campbell et al., 2019). Oncologic reconstruction was proportionally higher in Mexico (35%), reflecting national policies supporting breast reconstruction in cancer survivors (Álvarez-Díaz & Guzmán, 2021), while congenital anomalies accounted for a stable quarter of cases in both countries,

underscoring the humanitarian dimension of pediatric reconstructive surgery (Vallarta-Rodríguez et al., 2015; SCCP, 2024).

Litigation and arbitration causes (Figure 7) identified failures in informed consent as the leading source of disputes (38–40%), followed by unsatisfactory results and perioperative complications. This aligns with regional and international literature, where inadequate communication and unrealistic expectations remain the most frequent ethical challenges (Reyes et al., 2023; De Anda Aguilar & Martínez, 2023; Maroon, 2024). The influence of social media in shaping patient expectations has been identified as a key factor contributing to dissatisfaction, reinforcing the need for enhanced preoperative counseling (Farid et al., 2024).

Taken together, these findings highlight a specialty that is advancing technologically and pharmaceutically but remains challenged by ethical, legal, and social dimensions. Mexico demonstrates strong institutional oversight through CONAMED and arbitration systems, while Colombia illustrates the risks and opportunities of medical tourism and high-volume surgical practice (Campbell et al., 2019). Both contexts confirm the importance of aligning technical innovation with ethical responsibility.

The evidence suggests that future progress in aesthetic and reconstructive surgery in Latin America must prioritize three pillars: (1) equitable access to advanced technologies, (2) strengthening informed consent and ethical communication, and (3) developing multidisciplinary protocols to address new pharmacological influences such as GLP-1 therapies. These pillars will ensure that innovation is balanced with patient safety and ethical accountability, consolidating the specialty as both a scientific and socially responsible discipline (Arriagada, 2010; Consejo Mexicano de Arbitraje Médico, 2024; SCCP, 2024; SECPRE, 2024).

CONCLUSION

This study provides an integrative overview of recent advances and ethical challenges in aesthetic and reconstructive surgery in Mexico, with comparative insights from Colombia. The results highlight that while the specialty is experiencing significant growth—driven by technological innovation, pharmacological breakthroughs, and expanding reconstructive programs—it continues to face pressing ethical and legal challenges.

Demographically, the predominance of women and the concentration of patients in urban centers remain consistent with international trends, though the participation of men and semi-urban populations reflects a gradual diversification of demand. Body contouring procedures dominate aesthetic practice, a trend amplified by the widespread use of GLP-1 receptor agonists, while reconstructive efforts are strongly centered on trauma and oncologic cases. Microsurgery continues to define the standard for complex reconstructions, whereas robotic-assisted techniques and AI planning are emerging innovations that hold promise but require careful evaluation regarding cost, accessibility, and ethical integration.

Complications, though mostly minor, persist as an inevitable dimension of surgical practice. The presence of major adverse outcomes and the steady number of arbitration cases underscore the importance of perioperative safety measures, evidence-based protocols, and rigorous risk communication. Failures in informed consent remain the leading cause of disputes, highlighting that ethical communication and expectation management are as critical as technical expertise in ensuring patient-centered care.

The findings suggest three strategic priorities for the future of aesthetic and reconstructive surgery in Latin America: (1) strengthening ethical and legal frameworks to reinforce informed consent and patient autonomy, (2) promoting equitable access to advanced technologies and pharmacological innovations, and (3) consolidating multidisciplinary collaboration to address the evolving needs of patients. By aligning innovation with ethical responsibility, the specialty can continue to expand not only as a field of technical excellence but also as a

model of socially accountable medical practice.

REFERENCES

Álvarez-Díaz, J. A., & Guzmán, M. (2021). Impacto de la cirugía plástica mexicana en revistas internacionales: Análisis a 5 años. *Cirugía Plástica Ibero-Latinoamericana*, *47*(2), 105-112. https://doi.org/10.4321/S0376-78922021000200005

Arriagada, S. J. (2010). Algunas reflexiones éticas sobre la cirugía plástica. *Revista Médica de Chile*, *138*(7), 924-928. https://doi.org/10.4067/S0034-98872010000700016

Asociación Mexicana de Cirugía Plástica, Estética y Reconstructiva. (2024). *Cirugía Plástica, Estética y Reconstructiva*, *34*(1). http://www.medigraphic.com/pdfs/cplast/cp-2024/cp241.pdf

Campbell, C. A., Defazio, J., Butts, C. A., & Perdikis, G. (2019). Plastic surgery medical tourism in Colombia: A review of 658 consecutive patients receiving 1,796 cosmetic surgery procedures in Cartagena. *Plastic and Reconstructive Surgery Global Open*, *7*(7), e2348. https://doi.org/10.1097/GOX.0000000000002348

Consejo Mexicano de Arbitraje Médico. (2024). *Recomendaciones sobre cirugía plástica estética*. Documentos CONAMED. https://www.conamed.gob.mx/cmam/pdf/recomendaciones.pdf

Cuenca-Pardo, J., Ramos-Gallardo, G., & Morales-Olivera, M. (2019). Estratificación del riesgo de trombosis y profilaxis: ¿Cuál es la mejor puntuación para estratificar el riesgo de trombosis en los pacientes de cirugía plástica? *Cirugía Plástica, Estética y Reconstructiva*, *29*(1), 35-50. http://www.medigraphic.com/pdfs/cplast/cp-2019/cp191f.pdf

De Anda Aguilar, L. A. (2023). La práctica de la cirugía plástica estética y reconstructiva desde los datos de la Dirección General de Arbitraje de la CONAMED, 2012-2022. *Revista CONAMED*, *28*(3), 126-142. https://doi.org/10.35366/113065

De Anda Aguilar, L. A., & Martínez, M. R. (2023). Análisis de la práctica de la cirugía plástica estética y reconstructiva y la participación en los mecanismos alternativos de solución de controversias. *Revista CONAMED*, *28*(3), 107-108. https://doi.org/10.35366/113062

Del Río-Hernández, A. R., Ríos, R., & Vargas, M. (2025). The scope of plastic surgery: Perspectives of medical students in Mexico. *Cirugía Plástica, Estética y Reconstructiva*, *35*(1), 25-32. http://www.medigraphic.com/cgi-bin/new/resumenI.cgi?IDARTICULO=120842

Farid, Y., Othman, S., & Mosahebi, A. (2024). Artificial intelligence in plastic surgery: Insights from a global survey. *Plastic and Reconstructive Surgery Global Open*, *12*(1), e5457. https://doi.org/10.1097/GOX.0000000000005457

International Society of Aesthetic Plastic Surgery (ISAPS). (2024). *Abstracts of the ISAPS World Congress 2024, Cartagena, Colombia*. *Aesthetic Plastic Surgery*, *48*(Suppl. 1), 1-197. https://doi.org/10.1007/s00266-024-04011-3

Morales-Olivera, M., Cuenca-Pardo, J., & Gómez-Plata, J. (2021). Complicaciones más frecuentes en procedimientos estéticos en México: Análisis de reportes clínicos. *Cirugía Plástica, Estética y Reconstructiva*, *31*(2), 65-74. http://www.medigraphic.com/pdfs/cplast/cp-2021/cp212c.pdf

Palacios Huatuco, R. M., Camacho, E., & Triana, L. (2025). Aesthetic plastic surgery fellowship training in Cali, Colombia. *Aesthetic Plastic Surgery*, *49*(5), 2156-2157. https://doi.org/10.1007/s00266-024-04148-1

Ramírez, F., & López, C. (2020). Nuevas tendencias en la cirugía plástica reconstructiva. *RECIAMUC*, *4*(3), 97-108. https://reciamuc.com/index.php/RECIAMUC/article/view/510

Reyes, R. L., Hernández, J. C., & Gómez, P. (2023). La cirugía plástica estética: repercusiones jurídicas. *Revista CONAMED*, *28*(3), 143-150. https://www.conamed.gob.mx/gobmx/revista/pdf/revconamed-28-3-143.pdf

Sociedad Colombiana de Cirugía Plástica Estética y Reconstructiva (SCCP). (2024). *Información institucional y académica*. https://cirugiaplastica.org.co/

Sociedad Ecuatoriana de Cirugía Plástica, Reconstructiva y Estética (SECPRE). (2024). *Estatutos y misión*. https://secpre.ec/

Vallarta-Rodríguez, A., Morales-Olivera, J. M., & Duarte y Sánchez, A. (2015). La cirugía

plástica y su labor humanitaria en México. *Cirugía Plástica Ibero-Latinoamericana*, *41*(4), 379-386. https://doi.org/10.4321/S0376-78922015000400014

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflicts of interest.

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