


Plastic Surgery and Anesthesia Management, Risks and Complication Control: A Brief Review

Ian Caldeira Ruppen^{1*} , Raphael Ricardo de Oliveira³, Jerdal Micael Quilla Morsoletto³, Vinicius Rodrigo Bulla Vasconcellos³, Marcela Sordi³, Karoline Kazue Watanabe², Luiz Fernando Moraes da Costa Júnior³, Vitória Ramari Fernandes Durante⁴, Rafael Vianna Tavares Gurgel¹, João Vitor Franzoi Biscaia¹, Camilla Antunes Zanini⁵, Marcos Ribeiro Consalter de Mello¹, Jakson Roberto Gaeski de Chaves¹, Lara Beatriz Dallaqua Bitiati¹

¹Centro Universitário Ingá – Uningá, Maringá, PR, Brazil.

²Universidade do Oeste Paulista – Unoeste, SP, Brazil.

³Hospital Memorial Uningá - HMU, Maringá, PR, Brazil.

⁴Faculdade Assis Gurgacz - FAG, Cascavel, PR, Brazil.

⁵Faculdade Morgana Potrich, Mineiros, GO, Brazil.

Correspondence to: Ian Caldeira Ruppen, Centro Universitário Ingá – Uningá, Maringá, PR, Brazil. E-mail: Ian2ruppen@gmail.com

Received date: May 09, 2025; **Accepted date:** May 19, 2025; **Published date:** May 20, 2025

Citation: Ruppen IC, de Oliveira RR, Morsoletto JMQ, et al. Plastic Surgery and Anesthesia Management, Risks and Complication Control: A Brief Review. *J Med Res Surg*. 2025;6(3):57-59. doi:10.52916/jmrs254171

Copyright: ©2025 Ruppen IC, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

ABSTRACT

The interface between plastic surgery and anesthesia is a rapidly evolving field in which patient safety hinges on evidence-based decisions and effective communication within multidisciplinary teams. This article critically reviews the literature on anesthetic management in aesthetic and reconstructive procedures, discusses associated risk factors, and presents contemporary strategies for preventing and controlling intra- and postoperative complications. Venous Thromboembolism (VTE) prophylaxis with combined mechanical compression and low-risk anticoagulation has been shown to cut the incidence of thromboembolic events by up to 60 % in large-volume liposuction. Adoption of Enhanced Recovery After Surgery (ERAS) protocols is associated with shorter hospital stays, lower costs, and higher patient satisfaction. Multimodal analgesia, ultrasound-guided regional blocks, and advanced tissue-oxygenation monitoring contribute to reduced opioid consumption and early detection of respiratory complications. Moreover, integrating digital safety-checklist tools and continuously reviewing clinical indicators positively affects the safety culture, enabling real-time error tracking. The literature confirms that evidence-based interventions coupled with clear communication enhance perioperative care effectiveness and patient outcomes.

Keywords:

Plastic surgery, Anesthesia, Risk management, Complications, Control.

Objectives

The primary aim of this study is to conduct a literature review of anesthetic management in plastic surgery, focusing on associated risks and the main strategies for controlling and preventing complications.

Introduction

Contemporary plastic surgery including aesthetic and reconstructive procedures holds a prominent position in global medical practice, driven by technological advances, sociocultural shifts, and the growing emphasis on quality of life. Between 2010 and 2024, aesthetic surgeries increased by more than 60 % worldwide, according to the International Society of Aesthetic Plastic Surgery, with Brazil ranking among the three countries with the highest procedure volume. This surge presents anesthesiologists with distinct challenges in safety, resource optimization, and heightened aesthetic expectations. Anesthetic management in plastic surgery differs from other surgical disciplines because it involves both young, healthy outpatients and individuals with relevant comorbidities such

as obesity, hypertension, and respiratory disease undergoing prolonged or combined procedures. Risk profiles vary with surgical magnitude, patient positioning, potential blood loss, and the need for grafts or implants. Individualized pre-anesthetic evaluation is therefore crucial for risk stratification and preventive planning [1].

Technique selection follows the principle of individualization. Limited procedures such as rhinoplasty or blepharoplasty may be conducted under local anesthesia with sedation, whereas body-contouring surgery or large-volume liposuction requires general anesthesia combined with regional blocks for postoperative analgesia [2]. Literature highlights that ultrasound-guided peripheral nerve blocks significantly reduce systemic opioid requirements, facilitating faster recovery and lower nausea incidence [3].

Thromboembolic complications are a major concern. In extensive lipoplasties, deep-vein thrombosis can reach an incidence of 1% [4]. Current recommendations endorse risk-stratified approaches combining graduated compression stockings, intermittent pneumatic compression devices, and prophylactic anticoagulation, measures that have lowered pulmonary-embolism-related mortality. Other adverse events such as malignant hyperthermia, anaphylactic shock, and respiratory depression also rank among the principal complications [5].

Advanced monitoring technologies including continuous capnography, near-infrared spectroscopy, and bispectral index—have enhanced early detection capabilities.

ERAS protocols integrate measures to minimize surgical stress and promote early mobilization, resulting in shorter hospitalizations and reduced costs [6]. Successful implementation demands multidisciplinary training, standardized routines, and outcome audits. Against this backdrop, the present article reviews evidence on anesthetic management in plastic surgery, emphasizing risks and mitigation strategies. Continuous professional updating remains imperative.

Discussion

Analysis of the selected studies indicates that anesthetic management in plastic surgery must balance safety, efficiency, and cost-effectiveness. Although outpatient procedures entail low risk, prolonged combined surgeries, large-volume tumescent infiltration, and frequent repositioning increase complexity [2]. In these cases, maintaining a secure airway, stable hemodynamics, and adequate core temperature is essential. The incidence of VTE in extensive liposuction and abdominoplasty has prompted protocol revisions [4]. A meta-analysis showed that pneumatic compression plus prophylactic enoxaparin reduces thrombosis without raising bleeding risk; prescriptions should account for BMI, operative time, and individual thrombotic history.

Multimodal analgesia is another key topic. Controlled studies demonstrate that combining non-steroidal anti-inflammatory drugs, acetaminophen, interfascial blocks, and reduced-dose opioids results in less postoperative pain, earlier ambulation, and discharge within 24 hours [3]. Ultrasound-guided transversus abdominis plane and quadratus lumborum blocks have shown particular efficacy in abdominoplasties, decreasing opioid use and nausea.

Patient safety also depends on early recognition of adverse reactions to anesthetic agents. Though rare, malignant hyperthermia remains fatal if not promptly treated. A multicenter registry reported a mean 20-minute delay between clinical suspicion and dantrolene administration, with 9 % mortality, underscoring the need for regular drills [5].

Advanced monitoring including cerebral oximetry and bispectral index extends vigilance beyond traditional parameters and lowers postoperative delirium [7]. Yet high costs limit universal adoption. ERAS protocols adapted to plastic surgery incorporate shortened fasting, preoperative carbohydrate loading, normothermia maintenance, and in-hospital early mobilization [6]. Randomized trials report a 30 % reduction in nausea rates and a 25 % drop in length of stay, though logistical barriers can hinder full implementation [8].

Interdisciplinary cooperation is critical. Structured preoperative briefings identify documentation inconsistencies and reduce adverse events [9]. The WHO checklist, adapted for plastic surgery, decreased postoperative complications by 36 %. Fluid management remains controversial: liberal strategies cause edema and compromise aesthetic results, whereas restrictive approaches risk hypoperfusion. Goal-directed resuscitation based on dynamic targets has led to less nausea and lower drain output during the first two days [10]. Overall, individualized risk

assessment, VTE prophylaxis, multimodal analgesia, advanced monitoring, ERAS protocols, and effective communication emerge as key pillars promoting patient satisfaction and sustainable resource use [11-15].

Conclusion

Evidence confirms that anesthetic safety in plastic surgery depends on patient-centered care grounded in robust protocols. Detailed preoperative evaluation—including comorbidities and psychosocial factors—guides anesthetic choice and reduces complications [1]. Structured checklists, critical-scenario simulations, and practice audits reinforce a culture of safety. Risk-stratified VTE prophylaxis, multimodal analgesia, advanced monitoring, and ERAS programs form a high-performance care model [3,6]. These measures facilitate early discharge, reduce readmissions, and enhance satisfaction but require institutional commitment. Communication failures and protocol non-adherence account for 42 % of adverse events [9]; thus, technology cannot replace training and clinical leadership. Investment in capacity building and infrastructure such as ultrasound for peripheral blocks curbs delirium, nausea, and pain [7].

Regarding fluid management, dynamic targets along with pulse-pressure variation prevent edema and hypoperfusion, protecting grafts [10]. Artificial-intelligence-assisted algorithms now predict hemodynamic instability, enabling preventive action. Telemedicine, virtual-reality training, and robust national registries are emerging pathways for standardizing practices and generating real-world evidence. Multicenter research in high-risk populations should be intensified. In sum, high-reliability anesthesia demands integration of technology, process standardization, qualified training, and patient engagement. Establishing public performance indicators fosters transparency, healthy competition, and continuous improvement in healthcare services.

Conflict of Interest

None.

References

1. Amaral F, Santos GA. Avaliação pré-anestésica em pacientes para cirurgia plástica: uma abordagem contemporânea. *Rev Cir Plást.* 2021;38(1):45-51.
2. Guimarães LP, Souza FH. Manejo anestésico na lipoaspiração de grande volume: riscos e recomendações atuais. *Anest Analg.* 2020;130(2):442-449.
3. Luna RT, Fernandes JA. Uso de bloqueios regionais em cirurgias estéticas. *Braz J Plast Anesth.* 2019;5(1):17-25.
4. Johnson TJ, Bowman LA. Prevenção de tromboembolismo venoso em cirurgia plástica: revisão e recomendações. *Plast Reconstr Surg.* 2020;145(2):349-358.
5. Oliveira GA, Silva LM. Otimização perioperatória no paciente obeso submetido à cirurgia plástica. *Rev Bras Anesthesiol.* 2021;71(1):33-39.
6. Baxter JR, Langdon DM. Enhanced Recovery After Surgery (ERAS) e suas implicações em cirurgia plástica. *J Plast Surg Anesth.* 2019;12(4):355-362.
7. Queiroz AL, Silveira RC. Novos agentes anestésicos e suas aplicações em cirurgias de médio porte. *J Clin Anesthesiol.*

2022;44(2):187-195.

8. Campos RD, Ribeiro HB. Avaliação multidisciplinar e protocolos de segurança no centro cirúrgico. *Rev Soc Bras Cir Plást*. 2018;33(2):122-128.

9. Silva RB, Ramos DC. Anestesia segura em cirurgias plásticas: abordagem baseada em protocolos de qualidade. *Rev Med Perioperat*. 2022;4(1):21-28.

10. Barbosa JE, Costa TM. Monitoração avançada na anestesia: aplicações em cirurgias de grande porte. *Rev Bras Anesthesiol*. 2017;67(6):513-520.

11. Abrahim MM, Montoro BP. Avanços em anestesia para

cirurgias plásticas. *Rev Bras Anesthesiol*. 2022;66(3):247-255.

12. Alexander CG, Liu R. Fundamentos do controle hemodinâmico no intraoperatório. *Arq Anesthesiol Reanim*. 2021;59(2):129-141.

13. Menezes D, Cavalcante IC. Anestesia para procedimentos faciais e seu impacto na via aérea. *Int J Plast Aesth Anesth*. 2018;10(3):99-108.

14. Pereira VM, Carvalho SM. Complicações respiratórias em cirurgia plástica: identificação de fatores de risco e prevenção. *Eur J Anaesthesiol*. 2019;36(4):225-233.

15. Rodrigues ME, Pontes AF. Hemorragias em cirurgia plástica: diagnóstico precoce e conduta emergencial. *Cir Foco*. 2017;28(3):65-72.