

Contemporary Advancements in Nasal Tip Control: A Review of Suture Techniques, Grafts, And Structural Preservation in Rhinoplasty

Laura Soledad Castro Serrano^{*1}, Luis Alberto Gonzalez Valdez², Leslie Melissa Salmerón Bello³, Victor Esteban Kuri⁴, Rodrigo Alexis Velazquez Diaz⁵, Sarahí Carrillo Barraza⁶

¹Universidad Autónoma de Guadalajara

²Hospital Regional Salamanca PEMEX

³Escuela Nacional de Medicina y Homeopatía, Instituto Politécnico Nacional

⁴Centro Médico Licenciado Adolfo López Mateos ISEM

⁵Clinica Hospital B ISSSTE Chetumal Escuela nacional de medicina y homeopatía

⁶Hospital Universitario de Torreón

ABSTRACT

Nasal tip refinement remains a cornerstone of successful rhinoplasty, requiring a balance between aesthetic goals and structural integrity. This review synthesizes contemporary literature from 2020 to 2026, focusing on the transition from reductive maneuvers to structural and preservation-based techniques. We analyze the efficacy of septocolumellar anchorage sutures, the strategic application of infratip strut grafts, and the clinical outcomes of ligament preservation. By integrating findings from systematic reviews and long-term cohort studies, this paper identifies a clear trend toward "tip tensioning" and hybrid algorithms. The results suggest that while sutures provide dynamic control, preservation of the native ligamentous network is critical for long-term stability. This review provides a comprehensive framework for surgeons to navigate current techniques and identifies gaps in high-level evidence regarding long-term aesthetic sustainability.

KEYWORDS: Rhinoplasty, Nasal tip, Suture techniques, Cartilage grafts, Ligament preservation, Structural rhinoplasty, Tip tensioning.

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I. INTRODUCTION

Modern rhinoplasty has undergone a paradigmatic transformation, shifting away from aggressive reductive maneuvers toward structural and preservation approaches that prioritize long-term stability and respiratory function. Nasal tip refinement remains the most challenging aspect of the procedure due to the complex interaction between the cartilaginous framework, ligamentous support, and the soft tissue envelope (Savetsky et al., 2021). The objective of this review is to synthesize recent literature regarding tip control strategies, analyzing the efficacy of anchorage sutures, the role of cartilaginous grafts, and the emergence of ligament preservation as pillars for optimizing nasal projection and rotation.

II. EVOLUTION OF TIP SUPPORT AND DYNAMICS

The understanding of tip anatomy has evolved from a static view toward a dynamic model based on tension vectors. Schertzer et al. (2025) emphasize that tip stability fundamentally depends on the relationship between the lower lateral cartilages (LLC), the medial crural pillar, and the caudal septum. In this context, preoperative analysis has become more sophisticated, utilizing tools such as the "four-quadrant" approach and the "10-7-5" system to dissect anatomical subtleties before intervention (Savetsky et al., 2021). A consistent finding in the literature is the superiority of techniques that reinforce native support rather than weakening it. While historically excessive cephalic excision was the norm, current approaches emphasize "tip tensioning" through sutures that refine the shape without compromising structural integrity (Schertzer et al., 2025).

III. ANCHORAGE SUTURES AND TENSIONING TECHNIQUES.

Sutures have established themselves as primary tools for the fine-tuning of projection and rotation. The septocolumellar suture technique has demonstrated remarkable efficacy in long-term studies. Espinosa-Reyes et al. (2025) reported, in an analysis of 1,096 patients over 20 years, that anchoring the medial crura to the caudal septum at variable distances allows for precise control of tip aesthetics, with a stability rate of 96% after 12-month follow-up. In parallel, the use of step-by-step algorithms for suture selection (such as interdomal, transdomal, and rotation sutures) allows surgeons to customize the treatment based on the patient's anatomy (Trempe et al., 2020)

IV. CARTILAGINOUS GRAFTS: APPLICATIONS AND OUTCOMES

Despite the rise of suture techniques, cartilaginous grafts remain essential when natural support is insufficient. A recent systematic review highlights the high variability in the types of grafts used—autologous, homologous, and alloplastic—and notes that, although objective results are generally satisfactory, the quality of evidence remains heterogeneous (Skochdopole et al., 2023). Among the innovations, the infratip strut graft (ISG) in combination with the "Tongue-in-Groove" (TIG) technique stands out. Hanga and Menger (2024) propose this hybrid approach for patients with weak LLCs, providing superior definition at the infratip transition point while the TIG technique controls rotation.

V. THE PARADIGM OF LIGAMENT PRESERVATION.

Perhaps the most significant advancement in the last decade is the preservation and reconstruction of nasal ligaments. Ali et al. (2023) demonstrate that the preservation of the Scroll, septocolumellar, and Pitanguy ligaments in open rhinoplasty not only maintains tip projection but also improves early functional and aesthetic outcomes. This approach challenges traditional practices of extensive dissection, suggesting that restoring the ligamentous network is crucial to avoiding "polly beak" deformities and maintaining a natural appearance in the late postoperative period.

VI. CRITICAL DISCUSSION.

A clear trend toward individualized treatment is identified through hybrid algorithms that integrate sutures, grafts, and preservation. However, significant gaps persist. As noted by Skochdopole et al. (2023), much of the literature on grafts is based on observational studies of moderate quality. Furthermore, while Espinosa-Reyes et al. (2025) defend the success of sutures in closed rhinoplasty, others argue that the open approach remains the gold standard for visualization in complex cases (Savetsky et al., 2021).

Future directions should focus on three-dimensional morphometric analysis and patient-reported outcome measures (PROMs) to quantify efficacy more objectively.

CONCLUSIONS

The field of rhinoplasty has achieved a refined balance between sutural manipulation and grafted reinforcement. The integration of septal anchorage sutures, the strategic use of grafts such as the infratip strut, and the preservation of ligamentous architecture represent the vanguard of nasal tip control. While sutures offer delicacy and dynamic control, grafts provide the necessary support in challenging anatomies. The remaining challenge for the scientific community is to standardize outcome measurement to ensure that surgical finesse translates into stable and functional results.

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Figure 1.- Shield Graft



Figure 2.- Interdomal dissection

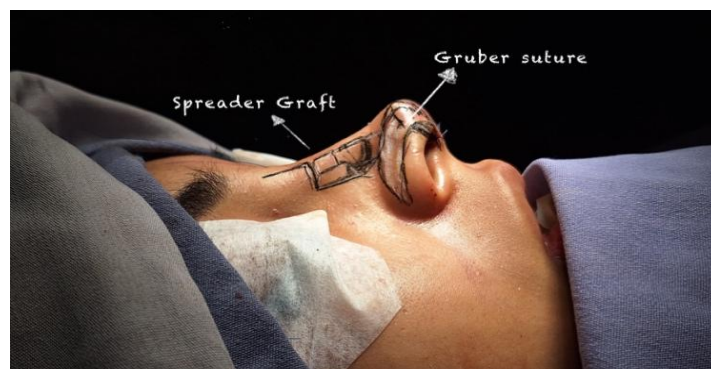


Figure 3.- Post operative result with tip sutures.