

Innovative Nasal Spine And Transalveolar Suturing Techniques For Barrier Membrane Stabilization: Comparative Clinical Outcomes In Two Cases

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ABSTRACT

Background:

Membrane stabilization is a crucial determinant of success in guided bone regeneration (GBR). Conventional fixation methods using screws or tacks can be costly, invasive, and prone to complications. This report describes two novel suture-based approaches—nasal spine and transalveolar sutures—as alternatives for securing barrier membranes in ridge augmentation.

Case Presentation:

Two patients requiring horizontal ridge augmentation were treated with non-resorbable membranes and particulate graft material. In Case 1, a nasal spine suture was placed by engaging the anterior nasal spine for superior membrane anchorage. In Case 2, a transalveolar suture was performed by creating alveolar perforations to secure the membrane without fixation devices.

Results:

Both techniques achieved excellent primary stability of the membrane. Postoperative recovery was uneventful, with no evidence of dehiscence, infection, or membrane exposure. CBCT confirmed proper positioning and effective space maintenance.

Conclusion:

Nasal spine and transalveolar sutures represent simple, cost-effective, and biologically favorable alternatives to conventional fixation screws in GBR. These techniques enhance membrane stability and predictability while reducing morbidity. Larger comparative studies are warranted to validate their clinical effectiveness.

Keywords: Guided bone regeneration, Nasal spine suture, Transalveolar suture, Ridge augmentation, Membrane stabilization

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INTRODUCTION

Membrane stabilization is a cornerstone in guided bone regeneration (GBR) and related oral surgical procedures. Adequate fixation of the barrier membrane prevents displacement, ensures space maintenance, and promotes predictable bone healing. Traditional stabilization techniques such as tacks and fixation screws, while effective, are associated with increased cost, risk of membrane tearing, and possible postoperative complications. This has prompted the development of alternative approaches that prioritize both stability and minimally invasive application [1,2].

Recent literature has highlighted innovative suturing techniques involving the anterior nasal spine and adjacent maxillary structures. The nasal spine suture, introduced as a novel approach for membrane stabilization, demonstrated superior anchorage, and improved clinical outcomes compared to conventional fixation methods [1]. Similarly, techniques adapted from rhinoplasty and nasal tip surgery—such as nasal tip and septal sutures—provide valuable insights into biomechanical stability at the nasal spine region, underscoring its potential as a reliable fixation point [2,3].

Other modifications, such as the “boomerang suture” and barbell fixation approaches, have been proposed for securing membranes in situations requiring ridge augmentation and sinus lift procedures [3,4]. These innovations reflect an evolving trend toward leveraging anatomical landmarks to achieve enhanced stabilization without reliance on metallic hardware. The importance of membrane stability is further supported by clinical trials and reviews emphasizing its direct impact on alveolar ridge preservation and bone regeneration outcomes [5,6]. Cone-beam computed tomography (CBCT) studies also reinforce the role of sutural

engagement in optimizing skeletal stability, particularly in mature patients where anatomical resistance is greater [7]. Moreover, reconstructive and plastic surgical evidence supports the biomechanical reliability of nasal tip and columellar sutures in controlling soft and hard tissue positions, adding further rationale for adapting these principles to GBR [8]. Therefore, the present case series describes and compares the application of nasal spine and trans alveolar sutures as innovative methods for membrane stabilization during ridge augmentation.

Case Presentation

Case 1 – Nasal Spine Suture

A 45-year-old male presented with a horizontal alveolar ridge deficiency in the anterior maxilla. The patient was systemically healthy, with no contraindications for surgery. Informed consent was obtained for treatment and publication.

Clinical and Radiographic Findings:

Clinical examination showed ridge collapse affecting prosthetic rehabilitation. CBCT confirmed a horizontal deficiency with preserved vertical height.

Surgical Procedure:

After administration of local anesthesia, a full-thickness mucoperiosteal flap was carefully reflected to expose the defect site (Figure 1a: Reflection of flap exposing the alveolar ridge defect). Particulate bone graft material was placed at the site to augment the ridge (Figure 1b: Placement of particulate graft material). A non-resorbable barrier membrane was then adapted to cover the graft and extend beyond the defect margins to ensure proper containment (Figure 1c: Adaptation of membrane over the grafted site).

To provide superior stabilization, a nasal spine suture was utilized. A suture was passed by engaging the

anterior nasal spine, anchoring the superior portion of the barrier membrane to this stable bony landmark (Figure 1d: Nasal spine suture placed to secure the membrane). This fixation ensured the membrane remained immobile throughout healing. The flap was then repositioned and closed without tension using interrupted sutures to achieve PRIMARY closure (Figure 1e: Tension-free flap closure with sutures).

Outcome:

Healing was uneventful. At one-month, soft tissue closure was intact with no membrane exposure. CBCT confirmed stable graft and membrane positioning. Postoperative evaluation showed intact sutures in the anterior maxilla (Figure 3a) and at one-month follow-up the ridge contour was well maintained with complete soft tissue coverage (Figure 3b).

Case 2 – Transalveolar Suture

A 42-year-old male was referred for augmentation of a horizontally deficient ridge in the premolar region. The patient's medical history was non-significant.

Clinical and Radiographic Findings:

Clinical examination revealed an atrophic ridge. CBCT confirmed inadequate width requiring augmentation.

Surgical Procedure:

After local anesthesia, a full-thickness mucoperiosteal flap was elevated to expose the alveolar ridge (Figure 2a: Flap elevation and exposure of the ridge). The site was prepared with particulate bone graft material, which was placed to augment the deficient ridge (Figure 2c: Placement of particulate graft material). A non-resorbable barrier membrane was adapted to cover the graft.

To achieve membrane stabilization, a transalveolar suture technique was used. Small perforations were made through the alveolar bone using a round bur (Figure 2b: Preparation of alveolar perforations for suture passage). Sutures were then passed transosseously through these perforations to secure the membrane firmly against the underlying graft (Figure 2d: Membrane stabilization using the transalveolar suture technique). This eliminated the need for fixation screws or tacks, minimizing invasiveness and cost. The membrane edges were carefully adjusted to ensure complete coverage of the grafted site. Flap closure was performed with tension-free interrupted sutures, ensuring primary closure.

Outcome:

Postoperative recovery was favorable, with no complications. At one month, healing was satisfactory with stable membrane positioning confirmed radiographically.

RESULTS

Both cases demonstrated favorable clinical and radiographic outcomes following guided bone regeneration with novel suture-based membrane stabilization.

Case 1 – Nasal Spine Suture

The nasal spine suture provided superior anchorage of the barrier membrane in the anterior maxilla. Immediate postoperative assessment confirmed excellent primary stability of the membrane. The patient reported minimal discomfort, and healing was uneventful. At the two-week follow-up, soft tissue closure remained intact with no signs of dehiscence or membrane exposure. One-month CBCT imaging revealed well-maintained space beneath the membrane and stable positioning of the graft material, confirming effective augmentation of the ridge.

Case 2 – Transalveolar Suture

In the premolar region, the transalveolar suture technique provided equally effective membrane stabilization. Transosseous passage of the suture through alveolar perforations ensured firm adaptation of the membrane over the graft. Clinical follow-up demonstrated satisfactory healing, with no evidence of infection or suture-related complications. At one month, CBCT showed stable graft containment and membrane retention, with adequate space maintenance for bone regeneration.

Comparative Outcomes

Both techniques successfully eliminated the need for fixation screws or tacks. No intraoperative or postoperative complications such as suture loosening, infection, or membrane exposure were observed in either case. The nasal spine suture offered strong anchorage in the anterior maxilla, particularly useful for vertical stabilization, while the transalveolar suture was advantageous in lateral ridge augmentation cases where alveolar bone could be perforated to achieve membrane fixation.

Results

Both nasal spine and transalveolar suturing techniques achieved superior primary stability of the barrier membrane compared to what is typically reported with

fixation screws. No intraoperative or postoperative complications were encountered, including suture dehiscence, infection, or membrane exposure. CBCT 6 months follow-ups in both cases demonstrated effective space maintenance and favorable graft containment. While both approaches proved effective, the nasal spine suture provided robust superior anchorage in the anterior maxilla, whereas the transalveolar suture was particularly advantageous in lateral ridge augmentation, eliminating the need for metallic fixation devices.

DISCUSSION

The stability of barrier membranes is a key determinant of success in guided bone regeneration (GBR). Traditionally, fixation screws or tacks have been employed to achieve stability; however, these techniques carry disadvantages such as increased surgical cost, the need for additional hardware, and risks of membrane tearing or soft tissue complications. In the present report, two novel suture-based approaches—nasal spine and trans alveolar sutures—were utilized as alternatives to conventional fixation, demonstrating effective stabilization and favorable clinical outcomes.

Nasal Spine as an Anchorage Point

Engaging the anterior nasal spine for stabilization is supported by evidence from craniofacial and rhinoplasty literature. The nasal spine has been successfully used as a fixation site in septal extension grafting and septal correction techniques due to its robust bony anchorage [9,10]. Choi et al. [11] also highlighted its structural reliability during orthognathic surgery for cleft patients. Extrapolating this principle to GBR, our case demonstrated that anchoring a membrane to the nasal spine provided excellent superior stability, preventing micromovement and graft displacement.

Transalveolar Suturing in Ridge Augmentation

The transalveolar technique involved creating alveolar perforations to pass sutures, offering effective stabilization without metallic devices. Comparable approaches have been described in sinus augmentation, where membrane suturing enhanced bone gain and reduced complications compared with conventional techniques [12]. Similarly, Johnson et al. [13] introduced the “triangle suture” method for GBR, underscoring the growing relevance of suturing strategies as alternatives to fixation screws.

Comparison with Existing Techniques

Sinus and ridge augmentation procedures often face complications such as membrane perforations, which negatively impact regenerative outcomes. Meta-analyses confirm that successful management of membrane stability is directly linked to improved implant survival rates [14]. In our cases, both suture techniques achieved space maintenance and graft containment comparable to hardware fixation, with the added benefit of reduced morbidity. Furthermore, anchorage through basal bone or stable anatomical points, as suggested by Tomaselli et al. [15], parallels our approach of leveraging skeletal landmarks for predictable outcomes.

Advantages and Clinical Implications

The nasal spine suture provided strong superior stabilization in anterior maxillary defects, while the transalveolar suture was particularly suited for lateral ridge augmentation. Both approaches were cost-effective, avoided the need for hardware, and reduced surgical invasiveness. Our findings add to the growing body of literature supporting suture-based methods for GBR. These techniques expand the surgeon’s armamentarium by offering reliable, low-cost alternatives to metallic fixation, while drawing upon biomechanical principles already established in craniofacial surgery.

Limitations

The present report is limited by the small sample size of two patients, which restricts the generalizability of the findings. Although both the nasal spine and trans alveolar suture techniques demonstrated excellent primary stability and uneventful healing, the lack of long-term follow-up prevents assessment of their impact on final bone regeneration and implant success. Furthermore, the procedures are technique-sensitive; improper perforation or suture placement may compromise membrane stability or disrupt the regenerative process. Comparative clinical trials with larger cohorts are necessary to validate these findings against conventional fixation methods such as tacks or screws.

CONCLUSION

The nasal spine and trans alveolar suture techniques represent effective, biologically favourable, and cost-efficient alternatives to conventional hardware-based membrane fixation in guided bone regeneration. In this report, both approaches provided excellent membrane stability, favourable healing, and predictable short-term outcomes without complications. The nasal spine suture offered strong superior anchorage in the anterior maxilla,

while the trans alveolar suture proved advantageous for lateral ridge augmentation. These findings suggest that suture-based stabilization methods can broaden the clinician's surgical armamentarium and potentially reduce the reliance on fixation screws. Further prospective studies and randomized controlled trials are recommended to establish their long-term efficacy and clinical predictability.

Figure 1. Intraoperative steps of nasal spine suture technique (Case 1).

- (a) Reflection of a full-thickness mucoperiosteal flap exposing the alveolar ridge defect.
- (b) Engagement of the anterior nasal spine with a stabilizing suture for superior anchorage.
- (c) Placement of particulate bone graft material in the defect area.
- (d) Adaptation of barrier membrane and primary flap closure with interrupted sutures.

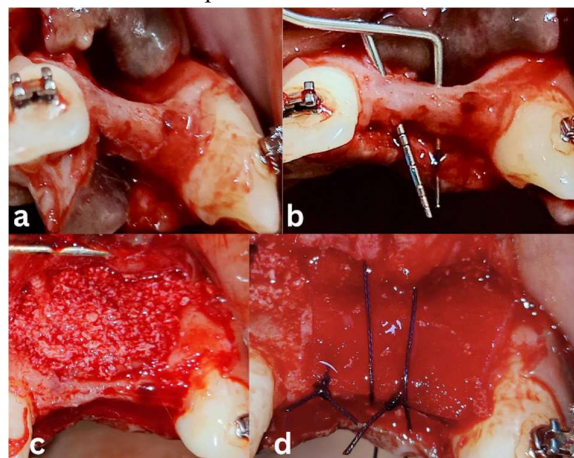


Figure 2. Intraoperative steps of trans alveolar suture technique (Case 2).

- (a) Flap elevation and exposure of the deficient alveolar ridge.
- (b) Preparation of trans alveolar perforations with a surgical bur for suture passage.
- (c) Placement of particulate graft material within the defect site.
- (d) Membrane stabilization using the trans alveolar suture technique prior to flap closure.

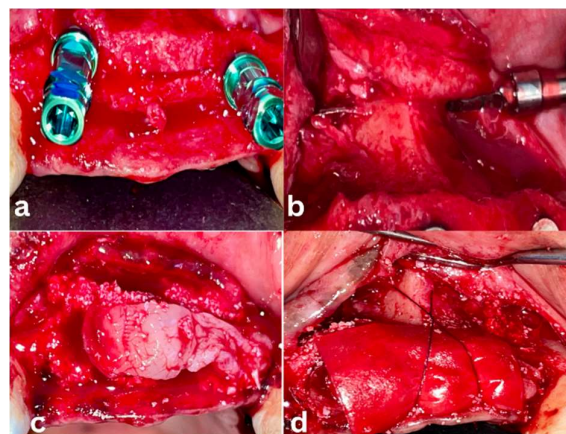


Figure 3. Postoperative healing of nasal spine suture case (Case 1).

- (a) Immediate postoperative view showing intact sutures and tension-free closure in the anterior maxilla.
- (b) One-month follow-up revealing uneventful healing, stable ridge contour, and complete soft tissue coverage without membrane exposure



REFERENCES

1. Bane WE, Blyleven GM, Lincicum AR, Stancoven BW, Inouye KA, Johnson TM. The nasal spine suture: A novel approach for membrane stabilization. *Clinical Advances in Periodontics*. 2024 Dec;14(4):300-9.
2. Cingi C, Muluk NB, Ulusoy S, Söken H, Altintoprak N, Şahin E, Ada S. Nasal tip sutures: techniques and indications. *American Journal of Rhinology & Allergy*. 2015 Nov;29(6):e205-11.
3. Özer S, Ergun O, Jafarov S, Süslü AE, Yılmaz T, Önerci TM. Comparison of the novel "boomerang suture" technique used in fixing the nasal septum to the anterior nasal spine of the maxilla with figure-of-8 suture. *B-ENT*. 2022 Jul 1;18(3):147-53.
4. Costa FC, Paradella TC, Raldi FV, Bianchi-de Moraes M, Nascimento RD. Barbell Technique Associated With Sinus Lift for Horizontal and Vertical

Guided Bone Regeneration—Case Report. *Case Reports in Dentistry*. 2025;2025(1):3253904.

5. Lee SJ, Lee J, Suh H, Ko YC, Urban I, Koo KT. The Impact of Membrane Stabilization for Alveolar Ridge Preservation in Periodontally Compromised Extraction Sockets: A Non-Inferiority Randomized Controlled Trial. *Journal of Clinical Periodontology*. 2025 Mar;52(3):471-83.

6. Kormas I, Pedercini A, Alassy H, Wolff LF. The use of biocompatible membranes in oral surgery: the past, present & future directions. a narrative review. *Membranes*. 2022 Aug 29;12(9):841.

7. Cho AR, Park JH, Moon W, Chae JM, Kang KH. Short-term effects of microimplant-assisted rapid palatal expansion on the circummaxillary sutures in skeletally mature patients: A cone-beam computed tomography study. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2022 Feb 1;161(2):e187-97.

8. Amador RO, Hamaguchi R, Bartlett RA, Austen Jr WG. Optimizing Nasal Tip Position: A Systematic Review of Columellar Strut and Septal Extension Grafts. *Annals of Plastic Surgery*. 2025 Oct 1;95(4):350-5.

9. Gan Y, Wu J, Peng S, Huang X, Chen X, Wu J, Guo Z, Lin J. Comparison of Nasal Packing, Trans-septal Suturing, and Submucosal Trans-septal Suturing Techniques After Septal Extension Grafts With Autogenous Costicartilage. *Journal of Craniofacial Surgery*. 2025 Sep 1;36(6):1953-7.

10. Sabino L, Cavalcanti L, Marcaccio C, Elzayat S, Procaccini A, Elfarargy HH, Barbara M. The novel traction-suturing technique in correction of caudal end deviation of the nasal septum. *European Archives of Oto-Rhino-Laryngology*. 2023 May;280(5):2293-8.

11. Choi JW, Park H, Kwon SM, Koh KS. Anterior nasal spine relocation with cleft orthognathic surgery. *Journal of Craniofacial Surgery*. 2021 Nov 1;32(8):2812-5.

12. Ari I, Karaca Ç, Er N, Ocak M. Effects of Sinus Membrane Stabilization by Dental Implant Placement and Membrane Suturing on Endo-Sinus Bone Gain in Cases of Lateral Sinus Elevation Performed Without Graft Material. *International Journal of Oral & Maxillofacial Implants*. 2024 Jul 1;39(4).

13. Johnson TM, Vargas SM, Wagner JC, Lincicum AR, Stancoven BW, Lancaster DD. The triangle suture for membrane fixation in guided bone regeneration procedures: a report of two cases. *Clinical Advances in Periodontics*. 2022 Sep;12(3):186-93.

14. Díaz-Olivares LA, Cortes-Breton Brinkmann J, Martínez-Rodríguez N, Martínez-González JM, López-

Quiles J, Leco-Berrocal I, Meniz-García C. Management of Schneiderian membrane perforations during maxillary sinus floor augmentation with lateral approach in relation to subsequent implant survival rates: a systematic review and meta-analysis. *International journal of implant dentistry*. 2021 Jul 12;7(1):91.

15. Tomaselli L, Giammarinaro E, Grassi R. Basal bone anchorage for immediate loading in the atrophic maxilla: A technical note with surgical case series. *Clinical Advances in Periodontics*.

