

Management of Treatment Results with Miniscrew Assisted Rapid Palatal Expansion, Challenges and Solutions: A Case Report

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Abstract: Miniscrew-assisted rapid palatal expansion (MARPE) has revolutionized the treatment of maxillary transverse deficiency in non-growing patients. By utilizing temporary anchorage devices (TADs), MARPE achieves skeletal expansion while minimizing the dental side effects seen in traditional RPE. However, the proximity to the mid-palatal suture and nasal floor introduces specific post-operative challenges. This review categorizes common complications and provides evidence-based management protocols for the orthodontic clinician.

Keywords: MARPE (Mini-screw-Assisted Rapid Palatal Expansion), Maxillary Transverse Deficiency, Orthodontic Mini-screws, Temporary Anchorage Devices (TADs), Skeletal Expansion, Peri-implantitis.

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I. INTRODUCTION

Miniscrew-Assisted Rapid Palatal Expansion (MARPE) is an orthodontic technique used to correct maxillary transverse deficiency, especially in late adolescents and adults where the mid-palatal suture has become more rigid and conventional rapid palatal expansion may be ineffective.

MARPE uses temporary anchorage devices (miniscrews) placed in the palatal bone and connected to an expansion appliance. The expansion force is transmitted directly to the maxillary skeletal structures, producing greater skeletal expansion with reduced dental tipping and periodontal side effects.

This technique provides a non-surgical alternative to surgically assisted rapid palatal expansion (SARPE) in many patients and has become an important method for achieving stable transverse maxillary expansion in orthodontic treatment.

Although MARPE has gained popularity in recent years, it comes with some complications. This article briefs the various complications and management of the same.

18 year old female visited with a chief complain of difficulty in breathing and forwardly placed teeth in upper front region of the jaw. Patient is diagnosed with maxillary transverse discrepancy with bilateral posterior crossbite. Miniscrew assisted rapid palatal expansion is planned with 4 mini-implants.



Fig 1 Pre-Treatment Intraoral Photographs



Fig 2 Placement of MARPE After Expansion

II. BIOMECHANICAL & INFLAMMATORY COMPLICATIONS

➤ Pain and Pressure Sensations

- The Problem: Patients frequently report a "pressure" sensation in the midface, bridge of the nose, or frontal region immediately following activation. This is due to the high-force orthopaedic loading of the circummaxillary sutures.
- Management: * Pharmacotherapy: Prophylactic use of NSAIDs (e.g., 400mg Ibuprofen) 1 hour before the initial activation and continued for 48 hours.
- Protocol Adjustment: If pain is severe, reduce the activation frequency (e.g., from two turns/day to one turn every other day) to allow for sutural adaptation.

➤ Soft Tissue Irritation and Hypertrophy

- The Problem: The palatal mucosa is thin and easily compressed. The "dead space" between the appliance body and the palate can trap food debris, leading to localized gingival hypertrophy or painful ulcerations.

• Management:

- ✓ Mechanical Relief: Ensure a minimum of 1–2 mm clearance between the metal framework and the soft tissue during installation.
- ✓ Topical Care: Use of orthodontic wax on miniscrew heads and antimicrobial gels (e.g., Benzocaine or Chlorhexidine gluconate gel) for active ulcers.

III. TECHNICAL AND HARDWARE COMPLICATIONS

➤ Miniscrew Stability and Failure

- The Problem: Loosening (mobility) of the TADs is the most common cause of MARPE failure. This is often linked to low bone mineral density (BMD) or excessive unicortical loading.

• Management:

- ✓ Stability Assessment: If a screw shows Grade I mobility, monitor closely and suspend activation. For Grade II+ mobility, the screw must be removed.

- ✓ Rescue Protocol: Re-insertion at a different site (paramedian) or utilizing a wider diameter screw to engage more cortical bone.

➤ *Asymmetric Skeletal Expansion*

- The Problem: Unilateral sutural "split" can occur if one side of the maxilla offers more resistance or if miniscrews on one side fail to engage the cortical bone of the nasal floor.

- *Management:*

- ✓ Diagnostics: Obtain a CBCT (Cone Beam Computed Tomography) to verify the split.
- ✓ Surgical Assist: If expansion remains strictly unilateral, a localized Corticopuncture or "Surgically Assisted" (SARPE) approach may be required to release the resistant side.

IV. BIOLOGICAL AND ANATOMICAL COMPLICATIONS

➤ *Peri-implant Infection (Mucositis)*

- The Problem: Plaque accumulation around the neck of the miniscrew can lead to peri-implantitis, characterized by supuration and bleeding.

- *Management:*

- ✓ Hygiene Regimen: Mandatory use of a curved-tip syringe to flush the space under the appliance with 0.12% Chlorhexidine.
- ✓ Antibiotic Intervention: If systemic signs (fever, lymphadenopathy) appear, a 5-7 day course of Amoxicillin or Clindamycin is indicated.

➤ *Epistaxis and Nasal Changes*

- The Problem: Because the palate forms the floor of the nasal cavity, the mechanical "split" can occasionally cause minor rupture of small vessels, leading to mild nosebleeds (epistaxis).

- *Management:*

- ✓ Immediate Action: Standard epistaxis control (head forward, pinch nostrils).
- ✓ Monitoring: Reassure the patient that increased nasal volume is a positive side effect that often improves breathing. Persistent bleeding requires ENT referral.

V. SUMMARY

Table 1 Management Quick-Reference

Complication	Primary Sign	Clinical Management
Mucosal Impingement	Erythema/Ulcer	Increase appliance clearance; apply topical lidocaine.
TAD Mobility	Visible screw movement	Suspend activation; consider replacement with a larger diameter.
Infection	Pus/Exudate	Professional debridement; Chlorhexidine irrigation; Antibiotics if systemic.
Nasal Pressure	Heaviness in midface	Reduce activation rate; saline nasal sprays.

VI. CONCLUSION

While MARPE is a powerful tool for correcting skeletal discrepancies, success is contingent upon the clinician's ability to distinguish between "normal" post-operative discomfort and "pathological" complications like screw failure or infection. Rigorous patient hygiene and frequent follow-ups during the activation phase are the keys to avoiding most adverse events.

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