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ORTHOPEDIC MAXILLARY EXPANSION IN YOUNG ADULTS: A CASE REPORT

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Abstract
This case report presents the orthodontic management of a 20-year-old male patient diagnosed with severe maxillary constriction, anterior open bite, and dental crowding. Treatment was performed using Mini screw-Assisted Rapid Palatal Expansion (MARPE) in combination with fixed orthodontic therapy. A digital workflow was used to design and manufacture the skeletally anchored expansion appliance as well as the placement guides, increasing accuracy and predictability of the outcome. Clinical and radiographic evaluations, including panoramic imaging and CBCT, confirmed orthopedic maxillary expansion, successful alignment and leveling of the dentition, intrusion of the lateral segments, and correction of the anterior open bite. This case demonstrates the clinical effectiveness of MARPE and digitally guided orthodontic approaches in young adult patients, offering a valid alternative to traditional methods when skeletal maturation limits their effectiveness.

Keywords:*Maxillary Expansion, MARPE, Skeletal Anchorage, Orthodontics, Maxillary Constriction, Temporary Anchorage Devices (TADs), Non-Surgical Maxillary Expansion*

Introduction

Transverse maxillary deficiencies in adults represent a clinical challenge due to the increased resistance of the midpalatal suture to orthopedic forces. Conventional rapid palatal expansion (RPE) often proves ineffective in skeletally mature patients, making the use of alternative strategies—such as surgically assisted expansion or skeletally anchored appliances—necessary. Miniscrew-Assisted Rapid Palatal Expansion (MARPE) offers a minimally invasive solution, particularly when combined with digital planning and 3D-printed appliances. This case report presents a non-surgical approach for the correction of severe maxillary constriction in a young adult patient using MARPE and fixed orthodontic treatment.

Case Presentation

A 20-year-old male patient presented to the Orthognathodontics Specialization School Clinic at Albanian University for evaluation. The chief complaints included aesthetic dissatisfaction and functional limitations due to:

• Severe maxillary constriction

• Anterior open bite

• Dental crowding

Diagnostic Evaluation

Extraoral clinical examination revealed no facial asymmetry, a dolichofacial pattern, a mildly convex profile, a normal nasolabial angle, and competent lips. Intraoral examination confirmed severe transverse maxillary constriction associated with a unilateral left posterior crossbite. In the sagittal plane, the patient exhibited Class I molar and canine relationships on the right side and Class II molar and canine relationships on the left side. In the vertical plane, an anterior open bite was present, with a negative overbite (OVB) of −2 mm.

Photographic examination confirmed maxillary constriction, anterior open bite, and reduced buccal corridor space.

Radiographic evaluation showed a complete permanent dentition with no apical pathology that could limit orthodontic treatment. CBCT imaging demonstrated a constricted maxilla without evidence of complete fusion of the midpalatal suture. Lateral cephalometric radiography and analysis revealed a vertical growth pattern, posterior mandibular rotation, and a markedly increased gonial angle.

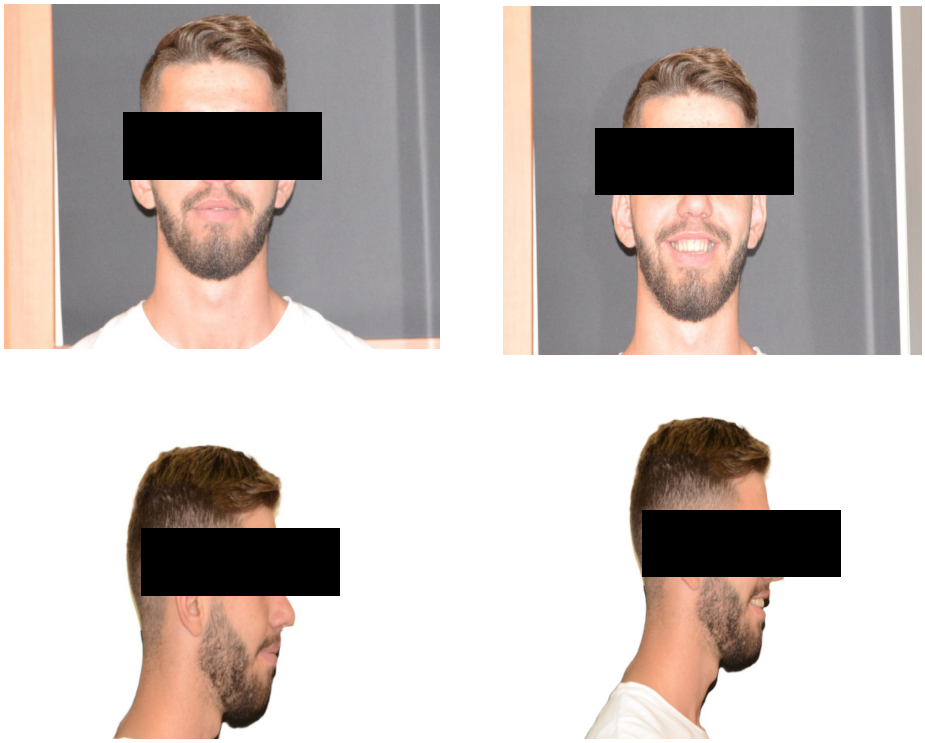

Fig. 1. Pre-treatment extraoral photographs

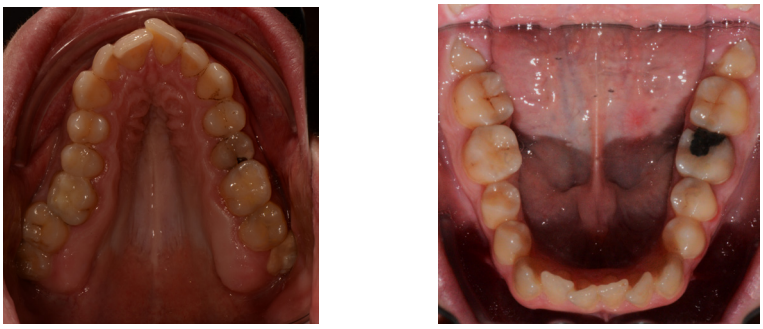

Fig. 2. Pre-treatment intraoral photographs

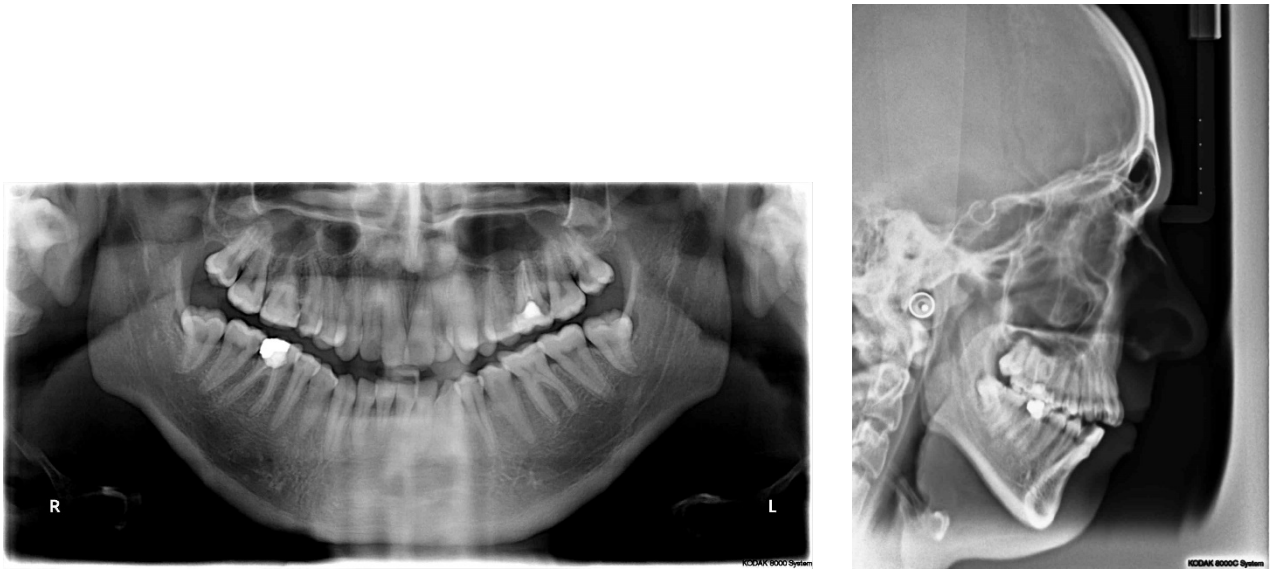

Fig. 3. Pre-treatment panoramic and lateral cephalometric radiographs

Treatment Objectives

The primary objectives of treatment were:
• To achieve orthopedic maxillary expansion
• To align and level both dental arches
• To correct the anterior open bite through intrusion of the posterior segments
• To improve facial aesthetics and restore proper occlusal function

Materials and Methods

Based on the diagnosis, a non-surgical expansion protocol with skeletal anchorage was selected. The treatment included:
• A MARPE appliance, fully digitally designed and 3D-printed, customized to the patient's anatomy. Lateral arms were incorporated to facilitate intrusive mechanics aimed at correcting the anterior open bite.
• Digitally fabricated surgical guides for miniscrew placement, ensuring maximum accuracy and optimal positioning.
• Temporary Anchorage Devices (TADs) placed under local anesthesia to provide skeletal anchorage.
• Standard fixed orthodontic appliances applied to both dental arches.
• Use of elastics and auxiliary mechanics for vertical control and closure of the anterior open bite.

The palatal expansion phase lasted 4 weeks, followed by 14 months of active orthodontic treatment.

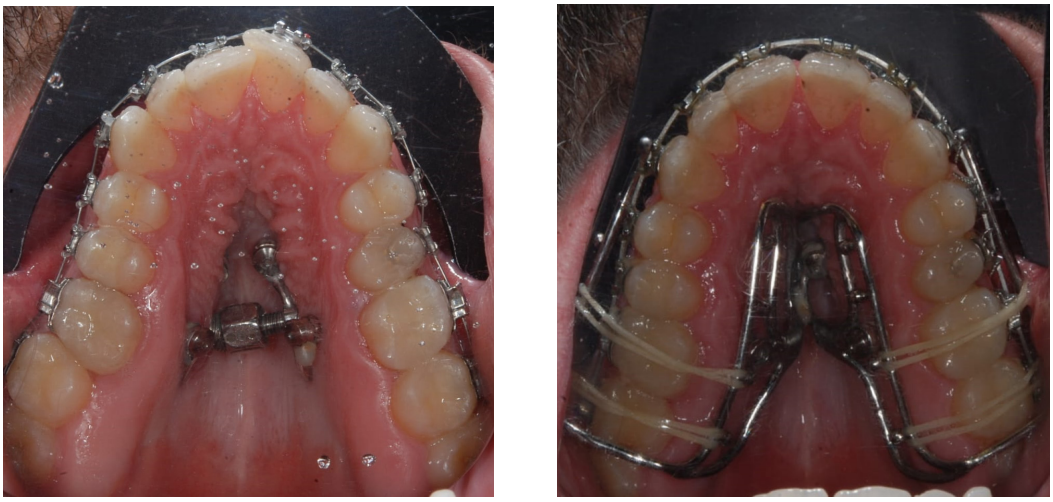

Fig. 4. MARPE appliance at the time of placement (left) and MARPE appliance with lateral arms for intrusion of the posterior segments (right).

Fig. 5. Intraoral photographs during the treatment phases

Results

After 1 month, CBCT imaging confirmed successful orthopedic maxillary expansion.

During 14 months of active orthodontic treatment, the following outcomes were achieved:
- Intrusion of the posterior segments, resulting in a reduction of the anterior open bite
- Complete alignment and leveling of the crowded dentition
- Restoration of proper interarch relationships and occlusal function
- Improvement in facial and dental aesthetics

No adverse effects were observed, such as periodontal complications or root resorption.

Discussion

MARPE has been established as an effective non-surgical method for maxillary expansion in late adolescents and young adults, extending the treatment window beyond adolescence. Skeletal anchorage allows true orthopedic changes by overcoming the limitations of conventional rapid palatal expansion (RPE). Furthermore, the use of a digital workflow facilitates precise appliance design, improves patient comfort, and ensures predictable outcomes.

This case supports the growing body of evidence demonstrating that MARPE, when combined with fixed orthodontic therapy and digital planning, represents a reliable and minimally invasive alternative to surgically assisted palatal expansion in carefully selected adult patients.

Conclusion

Rapid palatal expansion using a skeletally anchored appliance such as MARPE represents a valuable treatment option for managing maxillary constriction in patients who have completed growth. The integration of digital design and temporary anchorage devices (TADs) enhances treatment efficiency and accuracy. This case illustrates that significant orthopedic changes and complete orthodontic correction can be successfully achieved in young adult patients without surgical intervention.

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