

Evaluation of Mini Screw-Assisted Rapid Palatal Expansion for Managing Arch Perimeter: A Clinical Study

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ABSTRACT

Background: The present study was conducted to assess mini screw-assisted rapid palatal expansion for managing arch perimeter.

Materials & Methods: 24 patients with maxillary transverse deficiency, upper and lower arches crowding, Class II, division 1, subdivision right relationship and straight profile of both genders were treated with mini-screw-assisted rapid palatal expansion technique (MARPE). Pre- treatment and post treatment assessment of parameters was done.

Results: Out of 24 patients, males were 10 and females were 14. Pre- treatment SNA was 82.4° and post-treatment was 80.2°, pre- treatment SNB was 80.6° and post- treatment was 79.2°, pre- treatment ANB was 2.4° and post- treatment was 2.5°, pre- treatment SN- Go- Me was 36.2° and post- treatment was 37.4°, pre- treatment U1- SN was 105.3° and post- treatment was 106.4°, pre- treatment L1- NB was 32.5° and post- treatment was 32.1°, pre- treatment IMPA was 96.2° and post- treatment was 96.5°, pre- treatment Oct- SN was 16.7° and post-treatment was 19.2°, pre- treatment Upper lip to S line was -0.4 mm and post- treatment was 0.8 mm, pre-treatment lower lip to S line was 1.2 mm and post- treatment was 1.9 mm.

Conclusion: Authors found that mini screw-assisted rapid palatal expander might be recommended for patients at the final pubertal growth stage, in addition to adult patients with maxillary constriction.

Keywords: Rapid palatal expander, mini-screw, pubertal growth.

INTRODUCTION

Transversal anomalies are very common in clinical practice. In 80% of cases, their interceptive treatment is essential and must be administered as soon as possible to avoid periodontal, joint, or functional problems. It is based on an orthopedic technique aimed at separating the two maxillae above the level of the inter-maxillary palatal suture.¹

Conventionally, rapid maxillary expansion is performed in children who are still growing using a disjuncter supported by the teeth and using a median activator twice a day, or 0.5 mm per day. Many studies, including meta-analyses, have investigated the actual effects of rapid maxillary expansion at the skeletal, alveolar, and periodontal levels. Despite the beneficial effects of this method,

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there are still several disadvantages, which has led to new research.²

The maxillary transverse deficiency has been successfully treated in young patients by intervention on the mid-palatal suture for separating the maxillary bones with the rapid palatal expansion technique (RPE).³ In addition to the mid-palatal suture, exerted forces must counteract the resistance provided by circumaxillary sutures and structures such as zygomaxillary buttress and sphenoidal structures.⁴ Therefore, potential alveolar bending and dental tipping is expected from orthopedic forces exerted in adult patients, due to the progressively interdigitated suture pattern and increased stiffness of surrounding structures as skeletal maturity advances. Consequently, tooth resorption, periodontal damages, failure or limited expansion, questionable long-term stability, soft tissue swelling and ulcerations commonly results from conventional palatal expansion technique carried out in mature patients.⁵ The present study was conducted to assess mini screw-assisted rapid palatal expansion for managing arch perimeter.

MATERIALS & METHODS

The present study was conducted in the department of Orthodontics. It comprised of 24 patients with maxillary transverse deficiency, upper and lower arches crowding, Class II, division 1, subdivision right relationship and straight profile of both genders. All patients were informed regarding the study and their consent was obtained. Ethical clearance was obtained before starting the study.

Data such as name, age, gender etc. was recorded. A thorough oral examination was performed. The mini-screw-assisted rapid palatal expansion technique (MARPE) was started with MARPE appliance which consists of a conventional Hyrax expander supported by four orthodontic mini-screws. A slow expansion protocol was adopted, with an overall of 40 days of activation and a 3-month retention period. Intrusive traction mini-screw-anchored mechanics were used for correcting the Class II subdivision relationship, managing lower arch perimeter and midline deviation before including the upper central incisors. Pre- treatment and post treatment assessment of parameters was done. Results were

tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I: Distribution of patients

Total- 24		
Gender	Males	Females
Number	10	14

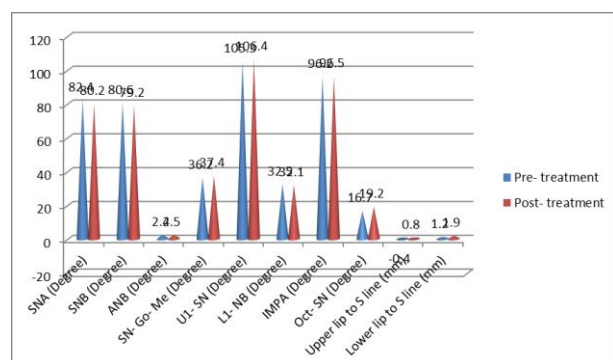
Table I shows that out of 24 patients, males were 10 and females were 14.

Table II: Cephalometric measurements

Measurements	Pre-treatment	Post-treatment	P value
SNA (Degree)	82.4	80.2	0.01
SNB (Degree)	80.6	79.2	0.03
ANB (Degree)	2.4	2.5	0.91
SN- Go- Me (Degree)	36.2	37.4	0.04
U1- SN (Degree)	105.3	106.4	0.02
L1- NB (Degree)	32.5	32.1	0.18
IMPA (Degree)	96.2	96.5	0.94
Oct- SN (Degree)	16.7	19.2	0.01
Upper lip to S line (mm)	-0.4	0.8	0.001
Lower lip to S line (mm)	1.2	1.9	0.07

Table II, graph I shows that pre- treatment SNA (Degree) was 82.4 and post- treatment was 80.2, pre- treatment SNB (Degree) was 80.6 and post- treatment was 79.2, pre- treatment ANB (Degree) was 2.4 and post- treatment was 2.5, pre- treatment SN- Go- Me (Degree) was 36.2 and post- treatment was 37.4, pre- treatment U1- SN (Degree) was 105.3 and post- treatment was 106.4, pre- treatment L1- NB (Degree) was 32.5 and post- treatment was 32.1, pre- treatment IMPA (Degree) was 96.2 and post- treatment was 96.5, pre- treatment Oct- SN (Degree) was 16.7 and post- treatment was 19.2, pre- treatment upper lip to S line (mm)

Graph I: Cephalometric measurements



DISCUSSION

In human beings, ossification of the mid-palatal suture occurs within the period from adulthood to the elderly stages in life; however, the primary fragility of ossification bridges is likely not to allow us to render them responsible for the unsuccessful outcomes of some inter-maxillary expansion procedures.⁶ Should that be the case, it is recommended that factors inherent to technique and ossification of other facial sutures be reassessed. The outcomes of palatal expansion vary from failure to a horizontal gain of 4 mm.⁷ Failure has been attributed to: patient's skeletal maturity; variation in the transverse measure, depending on the post-treatment moment when data were collected; and retention, with relapse of horizontal measures and maxillary movement downward being identified with the maxilla, later on, remaining unchanged or with its primary position restored.⁸ In order to overcome dentoalveolar undesirable effects and maximize skeletal expansion potential, a nonsurgical mini-screw-assisted rapid palatal expansion technique (MARPE) was introduced and recently demonstrated successful outcomes by providing effective mid-palatal suture splinting in adult patients.⁹ The present study was conducted to assess mini-screw-assisted rapid palatal expansion for managing arch perimeter.

In this study, out of 24 patients, males were 10 and females were 14. Cunha et al¹⁰ illustrated a 24-year old woman, with maxillary transverse deficiency. A non-surgical and non-extraction treatment approach was planned with mini-screw-assisted rapid palatal expansion technique (MARPE). It was found that post-treatment records show an intermolar width increase of 5 mm, bilateral Class I

molar and canine relationships, upper and lower crowding resolution, coincident dental midlines and proper intercuspation.

We found that pre- treatment SNA was 82.4° and post- treatment was 80.2°, pre- treatment SNB was 80.6° and post- treatment was 79.2°, pre- treatment ANB was 2.4° and post- treatment was 2.5°, pre- treatment SN- Go- Me was 36.2° and post- treatment was 37.4°, pre- treatment U1- SN was 105.3° and post- treatment was 106.4°, pre- treatment L1- NB was 32.5° and post- treatment was 32.1°, pre- treatment IMPA was 96.2° and post- treatment was 96.5°, pre- treatment Oct- SN was 16.7° and post- treatment was 19.2°, pre- treatment Upper lip to S line was -0.4 mm and post- treatment was 0.8 mm, pre- treatment lower lip to S line was 1.2 mm and post- treatment was 1.9 mm. Gholinia et al¹¹ reported the use of a mini screw-assisted rapid palatal expansion (MARPE) device for the correction of transverse skeletal maxillary constriction in an adult patient. The patient was a 20-year-old girl with a transverse maxillary deficiency and bilateral posterior cross bite. A MARPE device was positioned on her palate using 4 mini screws. The activation protocol was one-quarter turn per day every other day, with a total activation duration of 10 weeks following with a 3-month retention period. Pre-MARPE and post-MARPE cone-beam computed tomography cross sections presented a skeletal expansion of maxilla. This report confirms the effective treatment of a mature patient with severe maxillary constriction, highly deep palate, and posterior cross bite using a custom-made modification of MARPE.

The mini screw-assisted rapid palatal expander (MARPE) is characterized by a decrease in the excessive load performed by conventional appliances onto the buccal periodontal ligament of teeth to which they are anchored, thus resulting in flat, multiple resorption on their roots. However, clinically speaking, it does not involve any risks to patients. There is also a considerable decrease in the accidental movement of anchoring teeth, given that, with the use of MARPE, the support for the palatal expansion is no longer dental, but osseous.¹²

CONCLUSION

Authors found that mini screw-assisted rapid palatal expander might be recommended for

patients at the final pubertal growth stage, in addition to adult patients with maxillary constriction. It represents a treatment solution that can potentially avoid surgical intervention.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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