Case Report

Skeletal Expansion with GSR Expander

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ABSTRACT

This article reports two cases treated with a modified Miniscrew Assisted Rapid Palatal Expander (MARPE) that was fabricated in-office. Two female patients aged 15 years and 18 years were treated for maxillary expansion. An in-office modified GSR Expander was used. The appliance was secured in the patient's maxillary arch using four miniscrews. Expansion was carried out for 4 weeks and 2 weeks respectively. Considerable opening of mid palatal suture with skeletal expansion was observed. An economical and effective alternative to stock made MARPE with better adaptability and clinical modifiability.

KEYWORDS: MARPE, RME, Skeletal Anchorage

INTRODUCTION

Transverse deficiency is a common problem in orthodontics associated with clinical conditions such as posterior cross-bites, blocked tooth, functional corrections and collapsed arches in cleft palate patients.[1]The treatment in these cases involves the expansion of maxilla along the mid palatal suture. Maxillary expansion remains one of the common methods of gaining space in mixed dentition as well as in adult malocclusions.[2] It can be rapid or slow. Rapid Maxillary expansion can be further classified as tooth borne or tooth and tissue borne.

Maxillary skeletal expansion devices are anchored to the palatal bone providing absolute anchorage to RME appliances, opening up the interdigited mid-palatal suture, even in adults, bringing about more skeletal effects as compared to dento-alveolar changes. Miniscrew Assisted Rapid Palatal Expander (MARPE) has been introduced which incorporates miniscrews for enhanced skeletal effects of the appliance.[3]

The limitations of such stock MARPE, however includes the limited size options that make their clinical adaptation difficult at times. In cases with impacted teeth there is always a risk of damaging the impacted tooth while placing the appliance. Also, Stock MARPE and/or 3D printed customized appliances are expensive. This article reports two cases treated with a MSE which was modified and fabricated in-office.

AIM

The modification aims to give a more economical and adaptable alternative to the expensive, stock design MARPE available in the market.

MATERIALS AND FABRICATION

The materials required included one Hyrax type RME screw (Figure 1), two stainless steel surgical miniplates- straight (Figure 2) or L- shaped (Figure 3) and four miniscrews of dimension 1.5 mm x 10 mm (Figure 4).

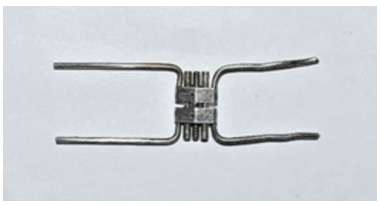


Figure 1: Hyrax type RME screw

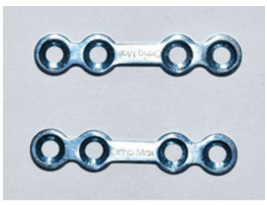


Figure 2: Stainless steel miniplates

Figure 3: L-shaped stainless steel miniplates

Figure 4: 1.5 x 8 mm miniscrews

A primary pick up impression of patient was taken after banding the maxillary first molars and cast model made. The appropriate size of Hyrax RME was selected. The two surgical miniplates were soldered over the expansion screw body on each side of the perforated cylinder. (Figure 5). The modified Hyrax screw MSE appliance is shown in Figure 6

Figure 5: Soldering the plates on the body of the screw

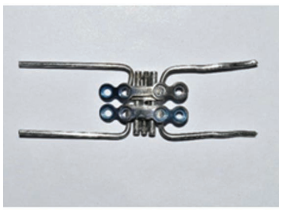


Figure 6: GSR Expander appliance

The hyrax arms was then adapted to the palatal anatomy and soldered on the molar bands. The appliance was then transferred to the patient's mouth by cementing the molar bands on maxillary first molars. Two miniscrews were placed anteriorly and two posteriorly for fully securing the appliance in the palate.

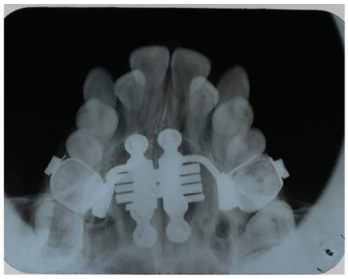
CASE 1:

A 15 year old pubertal female with Skeletal Class I jaw base with an underlying vertical growth pattern, Dento-alveolar Angle's Class II malocclusion subdivision left, reported with chief complaint of irregularly placed teeth. The crowding in maxillary arch was found to be about 12 mm. Maxillary midline was shifted to left by 2mm.

Figure 7 shows the pre-treatment maxillary arch clinical photographs (a) along with the GSR expander placed in the arch clinically (b) and radio-graphically (c).

The expansion was carried out using straight plate GSR expander by two turns per day for four weeks.[4]

A B



C

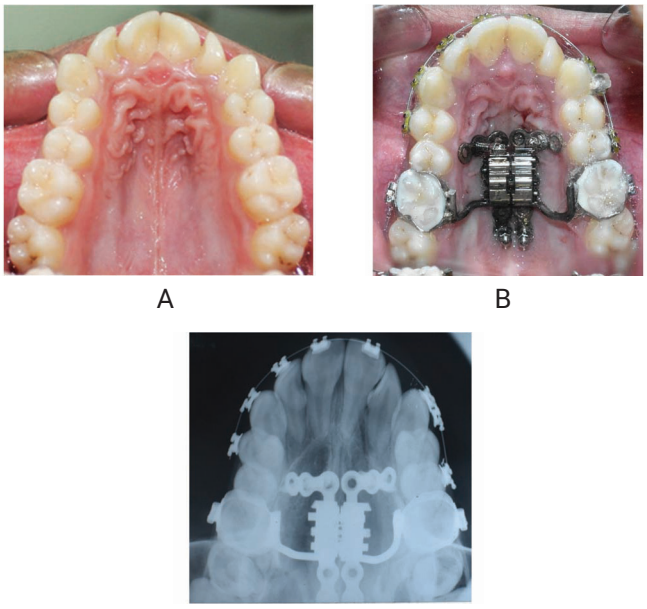
Figure 7: (A) pre-treatment maxillary arch clinical photographs (B) GSR expander placed in the arch clinically (C) occlusal radiograph post-insertion

CASE 2:

A 18 year old post pubertal female with Skeletal Class II jaw base relation on account of backwardly placed mandible with an underlying horizontal growth pattern, Dento-alveolar Angle's Class II malocclusion subdivision left, reported with chief complaint of irregularly placed teeth. The crowding in maxillary arch was found to be about 7 mm. Maxillary midline was shifted to right by 1mm.

Figure 8 shows the pre-treatment maxillary arch clinical photographs (A) along with the GSR expander placed in the arch clinically (B) and radio-graphically (C).

The expansion was carried out using L-shaped GSR expander by one turn per day for two weeks.[4]



A B

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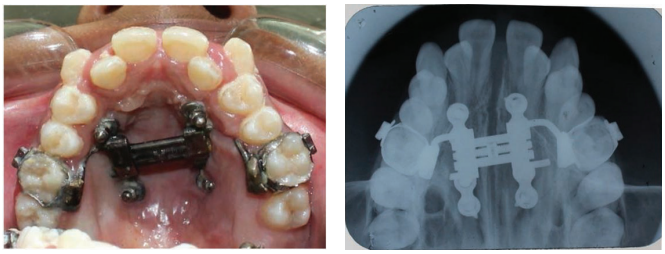
Figure 8: (A) Pre-treatment maxillary arch clinical photographs (B) GSR expander placed in the arch clinically (C) occlusal radiograph post-insertion

RESULT

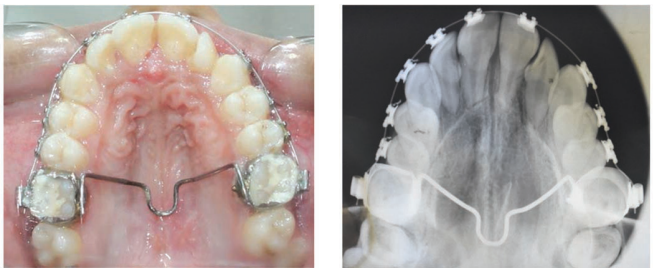
Approximately 2.5 to 3 mm of skeletal sutural opening was observed at the end of the expansion protocol in Case 1 after 4 weeks. (Figure 9)



A B

Figure 9: (A) Post-treatment maxillary arch clinical photographs
(B) Occlusal radiograph post-expansion protocol

Approximately 1 to 1.5 mm of skeletal sutural opening was observed at the end of the expansion protocol in Case 2 after 2 weeks. (Figure 10)



A B

Figure 10: (A) post-treatment maxillary arch clinical photographs
(B) occlusal radiograph post-expansion protocol

DISCUSSION

The primary goal of rapid maxillary expansion is opening up of the interdigited mid palatal suture so that the two palatal halves can be separated and the transverse arch development can occur.[5] Skeletal expansion is difficult to achieve in adult patients as the mid palatal suture is well interdigited. Traditional RME designs take anchorage from the molars and premolars and the palatal tissue which often causes buccal tipping and extrusion of the molars.[6]

Maxillary skeletal expansion devices are anchored to the palatal bone providing absolute anchorage to these appliances. The skeletal effects brought by such appliances are more than their dentoalveolar changes.[7] The introduction of MARPE by Lee in 20103, has made expansion in adult maxillary arches easier and more efficient. Various configurations and designs have since been documented.

However, two major disadvantages are associated with these expanders:

1. Lack of clinical design modification ability
2. High cost

The limited size ranges of such stock made MARPE make their clinical adaptation difficult and at times less optimum. Moreover, in cases with impacted teeth there is always a risk of damaging the impacted tooth while placing the appliance.

The next problem is the cost-effectiveness of these appliances. MARPE manufacturing costs are high and even more so if they are custom made using 3D printing. The average cost of commercially available original MARPE and customized 3D printed MARPE is almost 10 to 14 times as compared to that of our in office fabricated MSE.

The in-office fabrication of MARPE uses our regular day to day expansion screws and plates to modify each expander according to our requirements without burning a hole in our pockets. The customization can be readily done on the patients cast and modified according to the clinical scenario and availability of bone.

Differential expansion can be achieved in the anterior and posterior palatal region by adapting the arms of Hyrax and the surgical plates accordingly. A palatal impacted tooth can be easily bypassed even while expansion is carried out by using a L-shaped plate.

With non-extraction treatment plans gaining popularity and miniscrews helping us to broaden our horizons, the cost should not be a bar in giving absolute expansion results even in adults. Our in-office modified MSE is another step forward in bridging the gap between economical appliances and high-quality treatment results.

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