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Micro-implant Assisted Rapid Palatal Expansion (MARPE): A Comprehensive Review on Biomechanics, Clinical Protocols, and Recent Advances

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ABSTRACT

Mini-implant Assisted Rapid Palatal Expansion (MARPE) is a non-surgical orthopedic procedure aimed to treat maxillary transverse inadequacies among adolescent and mature patients. Traditional rapid palatal expanders work differently from MARPE, with the latter utilising mini-implants in order to receive skeletal anchorage, thus alleviating undesirable tipping of the dental structures and more effective skeletal broadening. It is especially indicated for patients past the conventional age of growth development, where classic expansion techniques yield poor results.

MARPE appliances have a central jackscrew retained by mini-implants that are fixed in the mid-palatal suture, providing more orthopedic forces for the separation of the skeletal structures. The success of MARPE is dependent on accurate case selection, optimal appliance design, and compliance with activation protocols. Its efficacy has been proven through studies to achieve opening of the mid-palatal suture, enhance nasal airway volume, and enhance facial aesthetics. MARPE has also been proven effective in treating obstructive sleep apnea by widening the nasal cavity.

Although MARPE has its benefits, it is not without its limitations, such as potential failure in heavy mid-palatal suture resistance cases, discomfort, and some minor complications such as irritation of soft tissues. Recent developments in imaging technologies, such as CBCT, have been a valuable factor in enhanced diagnosis, treatment planning, and outcome assessment in MARPE therapy.

As an alternative to surgically assisted expansion methods, MARPE is a milestone in orthodontics, lying in between traditional and surgically assisted maxillary expansion.

Keywords: MARPE (Micro-implant Assisted Rapid Palatal Expansion), Maxillary Expansion, Palatal Sutures, Skeletal Expansion, Orthopedic Treatment, Dentoalveolar Changes, Cephalometric Analysis, Miniscrew Implants, Maxillary Deficiency, Bone-borne Expander

INTRODUCTION

Transverse maxillary deficiency is a relatively often encountered orthodontic problem, which is common in all age ranges, from deciduous to permanent dentition and is frequently manifested by a unilateral or bilateral posterior crossbite [1].

Maxillary transverse deficiency is multifactorial in aetiology and among the most common of these factors are limited palatal dimensions, inheritance, ectopic eruption, defective maxillary transverse growth that is associated with a cleft palate and breathing disorders and imbalance of soft tissue such as excessive digit sucking, low tongue position.[2,3]

If maxillomandibular transverse discrepancies are not treated within a proper time, they can worsen and transform into more complicated malocclusion, which will impede the growth and development of the face.[4]

Maxillary transverse deficiency affects not only the occlusion in the transverse plane but also in the sagittal and vertical planes resulting in complex situations, including posterior unilateral or bilateral crossbites, crowding, scissor bite, non-carious cervical wear, unfavorable periodontal stress, compromised masticatory ability, mandibular functional shift, faulty buccolingual tipping of the posterior teeth, asymmetric mandibular posture in growing patients, joint disorders and muscle function disharmony.[5,6]

Nevertheless, the serious consequence of maxillary transverse deficiency is the narrowing of the nasal cavity, which elevates nasal air resistance and could become an aetiologic factor of Obstructive Sleep Apnea Syndrome (OSAS). [7,8]

In class III malocclusions almost half of the patients present maxillary skeletal retrusion, which is one of the causes of transverse discrepancies between maxilla and mandible .[9]

Posterior crossbite and dental crowding are two readily identifiable clinical signs of transverse deficiency, whereas excessive buccal flaring of the maxillary dentition and deep curve of Wilson in the lower dentition may camouflage the maxillary transverse constriction.[6]

The RME has been utilized for over a century to correct transverse maxillary deficiencies and the earliest widely quoted report was EC Angell's published in Dental Cosmos in 1860 .[10]

In the prepubertal age group, RME is a predictable treatment option [11]. The RME is less predictable in patients between the ages of 11 and 15 years because of the extreme variability in the growth phases of fusion of midpalatal suture.[12]

In skeletally mature individuals because of interdigitation complexity of midpalatal suture and reduced elasticity of bone, osseous articulations of the maxilla with the surrounding bones change with expansion becoming difficult.

RME may have undesirable effects such as buccal crown tipping, root resorption, gingival recession, alveolar bone dehiscence, thinning of buccal bone, marginal bone loss, pain, insufficient skeletal expansion or failure and post-expansion relapse.[3]

In late adolescents and adults, the midpalatal suture requires greater force to open because it possesses a higher level of inter-digitation. Surgical treatment with a standard RPE may also produce undesirable dental side effects .[13] Thus, from 16 years of age, surgically assisted RPE (SARPE) is routinely used to overcome the limitations of this by surgically releasing the interdigitated suture before maxillary expansion with an RPE appliance, like a hyrax or a Trans Palatal Distractor (TPD)[13,14]. Yet, the risks associated with a surgical procedure, combined with the expense, the hospital stay and concomitant morbidity could present a limitation for patients to seek this treatment.[14]

The subsequent search for a non-surgical correction for maxillary transverse deficiency in patients who would otherwise seek an application for a SARPE motivated the introduction of Miniscrew-Assisted Rapid Palatal Expansion (MARPE) by Lee et al. in South Korea and by Moon et al. in the USA.[15,16]

MARPE is either tooth-bone borne or a bone-borne RPE appliance with a rigid component that is attached to miniscrews placed in the palate, transferring the

expansion force to the basal maxillary bone directly. It was planned to achieve maximum skeletal and minimum dentoalveolar effects of expansion, according to the results of earlier histological research indicating that the midpalatal suture is not entirely ossified in man even at old age because of the continued mechanical stress it is subjected to.[17,18]

Understanding the biological events implicated in orthodontic, orthopedic and surgical procedures carried out in the midface requires knowledge about the structures of the midpalatal suture vertically and horizontally at different age groups.[19] The midpalatal suture is wrinkled and arranged in an overlapping as well as sinuous pattern, with bone margins with thick connective tissue interposed between them in three to five layers. It should be highlighted that the midpalatal suture:

The midpalatal suture is folded and, in an overlapping, as well as sinuous alignment, with margins of bone interspaced by thick connective tissue in three to five layers. It must be noted that the midpalatal suture:

1) Does not only represent the union of maxillary palatal processes, but also the union of alveolar palatal processes of the jaws and horizontal osseous laminae of palatal bones. Altering it means altering adjacent areas.
2) (2) It consists of three parts (Fig 1) which must be taken into account by all the therapeutic and experimental clinical analyses:

» the anterior segment: anterior to the incisive foramen, or inter-maxillary segment;

» the central portion: from the incisive foramen to the transverse suture to the palatal bone; » the posterior portion: following the transverse suture to the palatal bone.[19]

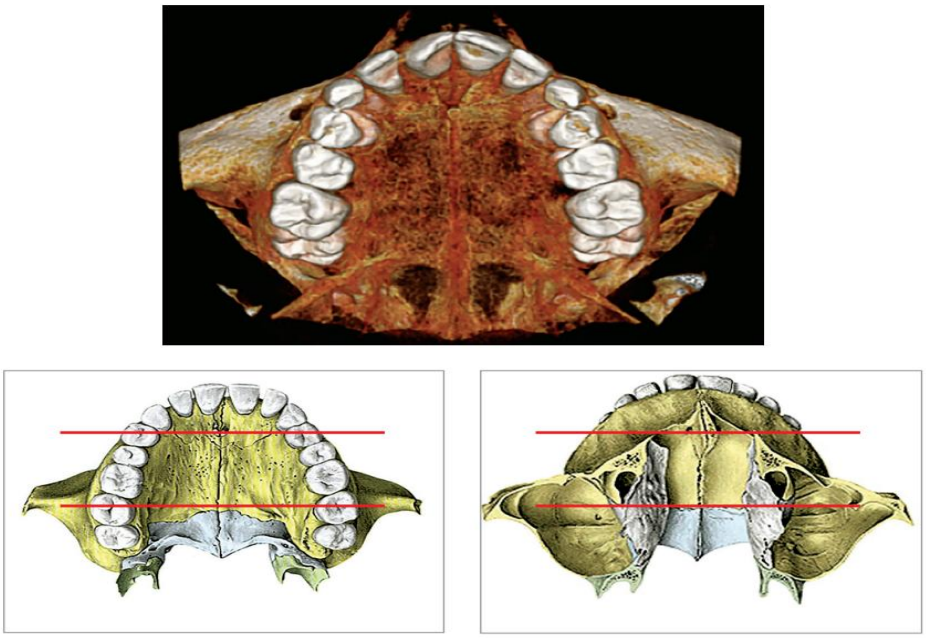

FIG 1- MIDPALATAL SUTURE AND ITS THREE SEGMENTS (ANTERIOR, MIDDLE AND POSTERIOR) WRT OTHER STRUCTURES[36]

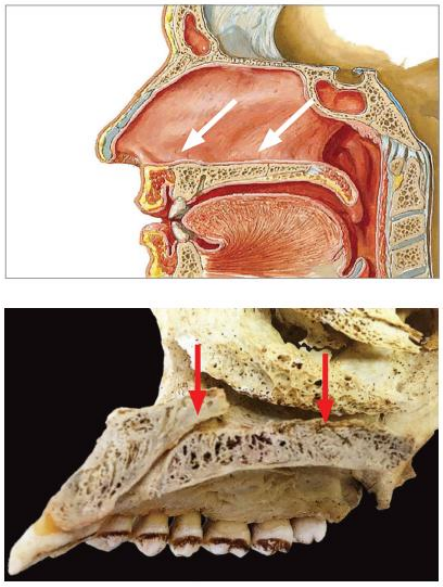

FIG 2-The incisive canal separates the anterior and middle segments of the suture. It extends in a posterior and upward direction and contains blood vessels, nerves, salivary gland tissue, and remnants of the nasopalatine canal. The posterior segment is associated with the suture running transversely across the palatal bone[36].

MIDPALATAL SUTURE CHRONOLOGY BY AGE GROUP

Midpalatal Suture (MPS) investigations by Melsen B; Zimring JF and Isaacson RJ found a correlation of the greater interdigitation of the MPS with the age of the subjects in preventing maxillary separation.[20,21]

They also stated that the peak resistance is not caused by the midpalatal suture but by the bordering maxillary articulation.

Bishara SE and Staley RN hypothesized that the resistance to MPS opening was observed at the sphenoid and zygomatic bones, more at the superior regions of the pterygoid plates of the sphenoid bone, and the anterior region of the zygomatic bone.[22]

The findings arrived at by Ennes[23] Ennes et al[24] and Ennes and Consolaro[25] in 2002 and 2004, based on investigations into the morphology of the midpalatal suture at various growth stages, still hold valid, particularly with respect to the following:

1) With the application of contemporary diagnostic methods, it is not possible to determine with accuracy and safety clinical and radiographic examinations of the initiation of ossification of the midpalatal suture as well as the extent of its structural involvement. It is safe to assert that the more aged the patient, the greater the probability that the midpalatal suture and the inter-relations of the maxilla ossify.

2) In human subjects, midpalatal suture ossification takes place in the phase between adulthood and elderly life stages; nonetheless, the initial weakness of ossification bridges is probably not to permit us to make them responsible for the failure of some inter-maxillary expansion treatments. If so, it is suggested that inherent technique and other facial sutures' ossification factors be reevaluated.

Marpe Appliance Design

The initial MARPE design was proposed by Dr Won Moon[26] which was fixed at the centre of the palate banded to the molars.

Subsequently, Dr Kee Joon Lee made a modification in the design by banding first premolars as well as first molars. This ensured good anchorage and adaptation according to the topography of the palate for efficient separation of the midpalatal suture.

Traditional Hyrax Rapid Palatal Expander was used to develop the Maxillary Skeletal Expanders or miniscrew assisted rapid palatal expanders by incorporation of miniscrews into the design by Carlson et al[26].

They asserted that their design created more of a parallel growth of maxillary bone and minimal dental tipping. The suggested changes were Bi-cortical anchorage of the mini-screws implants, posterior positioning of the implants, and decreasing the rigidity of the connecting wires. [27]

CLINICAL PRESENTATION OF MARPE APPLIANCE [Figure 1]

According to Lee's research, Mac Ginnis[27] et al created the maxillary skeletal expander (MSE) with four miniscrews which were positioned parallel to the midpalatalsuture.

The appliance consisted of two anterior screws of diameter-1.5-1.8mm, length-11-13mm which were adjustable based on the

anatomical thickness of the palate of the patient and two posterior screws of length 9mm[28].

Altered screw design in MSE— Hex head miniscrews (Medusa, Fav Anchor TMSAS, India) are smooth and less bulky for a secure and precise insertion and are thus more comfortable.

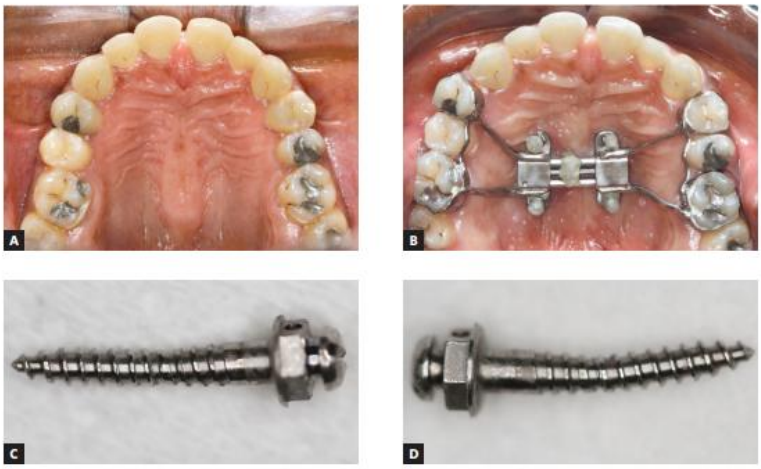

Figure 3-A, B) Occlusal view clinical photos taken before and after enlargement, respectively. C, D) After being extracted from the oral cavity, MARPE is secured by the mesial right and mesial left miniscrews[33].

They come in 2 sizes - short (2X10mm) and long (2X12mm) depending on needs. Two kinds of activation pin types are provided by Biomaterials Korea.inc[29],

(1) MSE pin type having a cycle of 4 activating turns of 90 each giving 0.2mm separation per turn and (2) spanner type of activation key that offers six activation turns for every 60° cycle and 0.33mm spacing.[29]

Depending on the location of miniscrews and stress distribution, different design types are categorized

TABLE 1 – MSE TYPE DESIGN

DESIGN TYPE	MINISCREW PLACEMENT	STRESS DISTRIBUTION
TYPE 1	Lateral to midpalatal suture	Concentrated around minicrews and MPS
TYPE 2	At the palatal slope	Low stresse evenly around the implants
TYPE 3	As in type 1 with additional conventional hyrax arms	Largely on the MPS and around micro-implants anchor teeth roots

INSERTION FACTOR CONSIDERATIONS

Appliance placement

• Anteriorly-Distal to the 3rd rugae of the anterior palate enhances the primary stability because of thick palatal bone, distributing the forces to the nasomaxillary complex.

• Middle-on the broad palatal but thinning bone surface of second premolar area. This is for close contact area with the jackscrew but is extremely dangerous to result in bicortical penetration.

• Posteriorly- directly anterior to the soft palate, at the area of the first permanent molar. This produces a greater orthopaedic effect because of the resistance provided by the pterygoid plates.

TABLE-2 CLINICAL & LABORATORY PROCEDURES FOR MARPE (MSE) TREATMENT

VISIT	CLINICAL PROCEDURE	LABORATORYPROCEDURE
1st	Separator placement on maxillary permanent 1st molars	
2 nd	1) Separators are removed followed by band placement on 1st molars after prophylaxis. 3) After the replacement of separators orthodontic accessories can be soldered to the bands at this stage.	2) Alginate impression is made and poured with regularplaster. 4) Selected MSE is soldered to bands according to curvature of the palate with 2mm separation from the palate. 5) Reverse traction screws are soldered (optional) on the buccal aspect of molar bands followed by finishing and polishing.
3 rd	Separators are removed and expander proof is placed after prophylaxis. Appliance cementation is done under topical anesthesia after vertical positional assessment. Self -drilling mini- implants are placed under local infiltrative anesthesia. Immediate expander activation is done using the appropriate digital key. Hygiene and activation instructions with optional analgesic drug prescription for 2 days should be given. Antibiotic coverage for good general health may not be required.	
Follow up	MI stability is checked with tweezers regularly. The distance of the expander from mucosa is checked at all visits. If the mobility of MI is witnessed, treatment can still be continued carefully with one proper MI on each side.	
Removal	Removal is done by counterclockwise rotation of jackscrew with the digital key Hydrogen peroxide dipped cotton pellet on MI removed site to promote asepsis. Oral Prophylaxis before removal is attempted to prevent Plaque accumulation	Removed MI should be discarded without sterilization and reuse

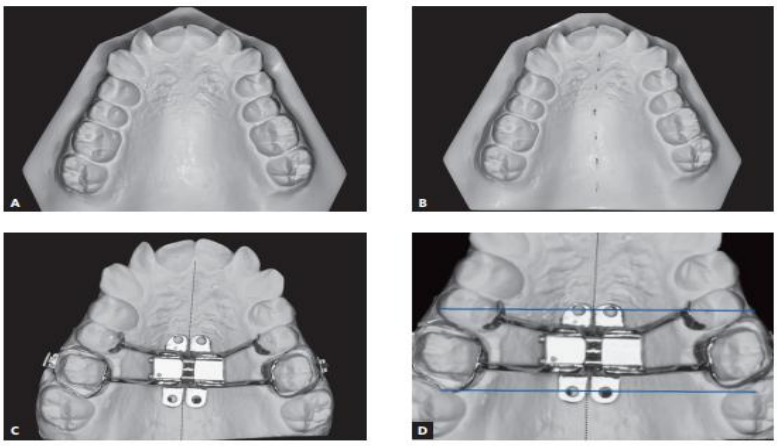

Figure 4 A) the first dental cast; B) the midpalatal suture is indicated by the dotted line; C) the expanding screw is positioned in accordance with the midpalatal suture; and D) the references lines are indicated in blue, transverse to MPS. Mesially and distal to the expanding screw, going through the middle of the miniscrews' fixation ring[33]

Appliance Insertion

Placement of the Temporary Anchorage Device (TAD) is tedious at times because of insufficient torque and direction of control to engage the implant in to hard palatal bone with an engine mounted or a straight driver.

A specially designed palatal driver (L'il One, Fav Anchor TMSAS, India) is preferable in providing the torque and angulation for accurate insertion and positioning of miniscrews.

The clinical protocol that is suggested to be adopted is noted in [Table2]

CLINICAL TIPS FOR INSERTION

Silicon-based material is used while making impressions for acquiring precise details which is needed in the process of digital workflow.

Miniscrews have to be positioned prior to luting cement curing.

A diagonal order of miniscrew placement into the appliance should be adopted.

The status of the root of the supporting teeth on the OPG should be assessed prior to band placement

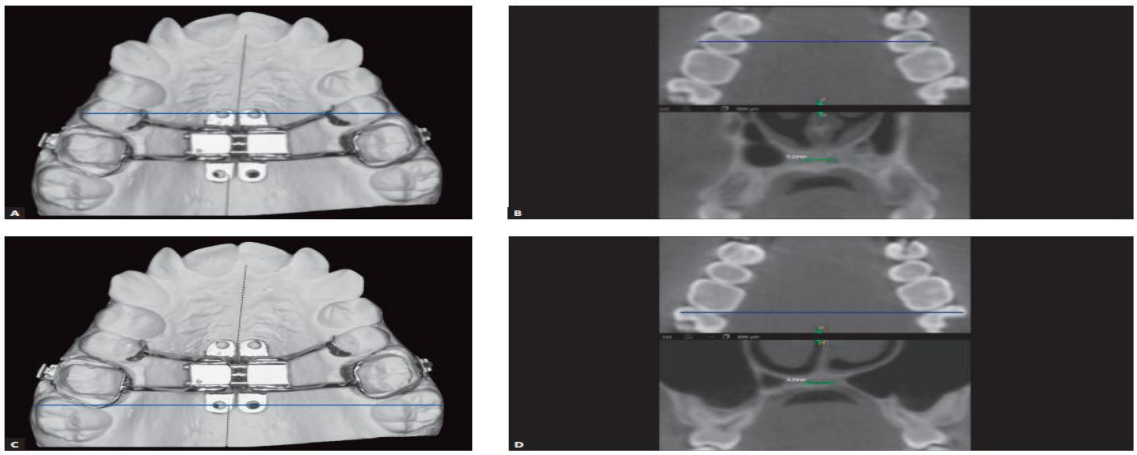

Fig 5-(A) dental cast displaying the reference line (in blue) that extends to the second premolars and passes through the miniscrews' fixation rings at the mesial area of the expanding screw (B)-CBCT pictures of the axial section with the reference line (in blue line) and the coronal section showing the amount of bone at the same distance from the midpalatal suture as indicated by the reference line's location on the axial section (in blue) (C) Dental model showing the reference line (in blue) that extends to the molars and passes through the miniscrew fixation rings at the expanding screw's distal area (D)CBCT pictures showing the amount of bone at the level of the reference line on the axial section (in blue) and on the coronal section showing the amount of bone equally spaced from the midpalatal suture (in blue)[33].

Appliance activation

The protocol for activation differs depending on the therapeutic goal and patient biotype.

Guidelines for activation schedule [Table 3] must be adhered to for improved treatment progress. On average, a separation of 0.2mm is attained per turn.

Activation is concluded once an edge-to-edge relation is established between the lingual cusps of the maxillary first molars and the buccal cusps of mandibular first molar.[28]

TABLE:3 ACTIVATION SCHEDULE

AGE GROUP	INITIAL EXPANSION RATE	EXPANSION AFTER OPENINGMPS (DIASTEMA FORMATION)
Beginning of adolescence (13- 16years)	3-4 turns /week	3 turns/week
End of adolescence (16- 19 years)	1 turn / day	1 turn/ day
Young adults (19- 25 years)	2 turns per day	1 turn/ day
Adults (Older than 25 years)	2 or more turns per day	1 turn/ day

RECENT DEVELOPMENTS

Improved method for enhanced activation:

Patients tend to need expert assistance when they cannot carry out expander activation in some instances because of higher sutural resistance. This might be addressed through an approach of corticopuncture[30] prior to miniscrew and MARPE placement.

Thin cortical bone is predrilled manually with 1.1mm diameter & 4mm bur and contra-angled screw driver ideally placed in 25 per min speed & 40Ncm torque for corticopunctures, under greater palatine nerve block anaesthesia.

There are eight corticopunctures of depth 5mm over midpalatine suture made manually by insertion and removal of a 9mm miniscrew of titanium alloy (5mm double thread, 4mm neck of &1.8mm diameter.). The 2 perforations are placed 2mm apart.

Following the procedure prescription of analgesics +0.12% CHX mouth wash for 7days can be administered.

Recent Advances in the Manufacturing Process of The Appliance Digital workflow

Adjustment of the MSE appliances in relation to the patient-specific parameters yields a better-fitting device according to palatal morphology. Virtual planning of the fabrication of MSE appliances using CBCT derived stereo-lithographic files (.stl files) acquired from intraoral or dental model scans are overlapped to determine the most appropriate antero-posterior and vertical position of the appliance based on the size and thickness of the palatal vault by assessment of parameters in the sagittal, coronal and axial planes.[31,32]

Qualitative bone assessment is not feasible through CBCT derived .stl file so that a CBCT DICOM file can be utilized for qualitative and quantitative bone evaluation for primary stability and stable anchorage assurance.

During superimposition, miniscrews are essentially placed aided by custom surgical guides(acquired from the patient directly if necessary) or direct virtual planning with the help of certain reference planes of CBCT midfacial skeletal landmarks is performed based on the best angulation and accurate directional placement using proper CAD software A unified combined.stl file for the negative template of MSE palatal expander is generated from which the final lab template is produced after subtraction from the 3d model created using dolphin software[33].

Trial fitting check of the fit of the MSE 3D model over the patient's palatal topography can then be performed followed by final appliance designing by seating the MSE in the template on the printed model. Post expansion assessment Skeletal and dental effects

The overall expansion attained is an association of dentoalveolar (orthodontic) expansion and skeletal (orthopedic) expansion comprising the alveolar bending bone and tipping dental.

In traditional hybrid bone-borne RPE appliances, center of rotation of maxilla is significantly above the position of miniscrew placement, resulting in generation of torque in two maxillae causing bending of alveolar bone[27].

Although the relative position of anchored teeth was not altered dental tipping may be seen due to bending of alveolar bone.

By applying the expansion forces directed nearer to the center of resistance of maxilla, more lateral translation of the complex would be attainable with lesser tipping of teeth.

As the highest resistance against sutural opening is the pterygomaxillary complex, the body of MARPE must be placed near the hard and soft palate junction[27].

If the forces are directed to maxilla's center of resistance through proper micro implant placement via customized MARPE appliances, then the force system becomes more advantageous which would actually eliminate the tilting forces as a result of homogeneous force distribution on the posterior teeth allowing more parallel midpalatalsutural opening coronally.

Pterygoid plate separation with MARPE produces a parallel expansion when compared to SARPE that produces a "V" expansion due to the fact that there is no pterygoid plate separation at the mid palatal suture[34]. Bony resistance to maxillary expansion would be lesser in children and adolescents since their pterygomaxillary and zygomaticomaxillary sutures are less matured. In adult patients owing to higher bony resistance provided, a lot of orthopedic force will be felt on the anchor teeth as well leading to dental tipping and bending of alveolar bone.

The zygomatic bone demonstrates a forward and lateral displacement. The forward displacement is minimal overall, while the lateral displacement is greater closer to the zygomaticomaxillary suture and decreases gradually towards the temporal process of the zygomatic bone (zygomatic arch) and continues to decrease towards the frontozygomatic suture.

Generally, the zygoma rotates along with the zygomaticomaxillary complex with the frontozygomatic suture acting as the fulcrum.

Cantarella and others say that there may be nearly no displacement that may be visible above the frontozygomatic suture and a possibility of asymmetric growth due to variation in densities and morphology of bones particularly the zygomatic buttress and pyramidal process which might not be the same on both sides.

He proposed that the fulcrum of rotation of the maxilla should be more posterior and lateral in MARPE compared to the tooth-borne appliance. As the maxilla is positioned medially and anteriorly to this fulcrum of rotation, during expansion the maxilla rolls laterally and anteriorly. This action also assists in the disarticulation of pterygopalatine sutures. There is hardly any displacement of the pterygoid fossa and the infra-temporal surface.

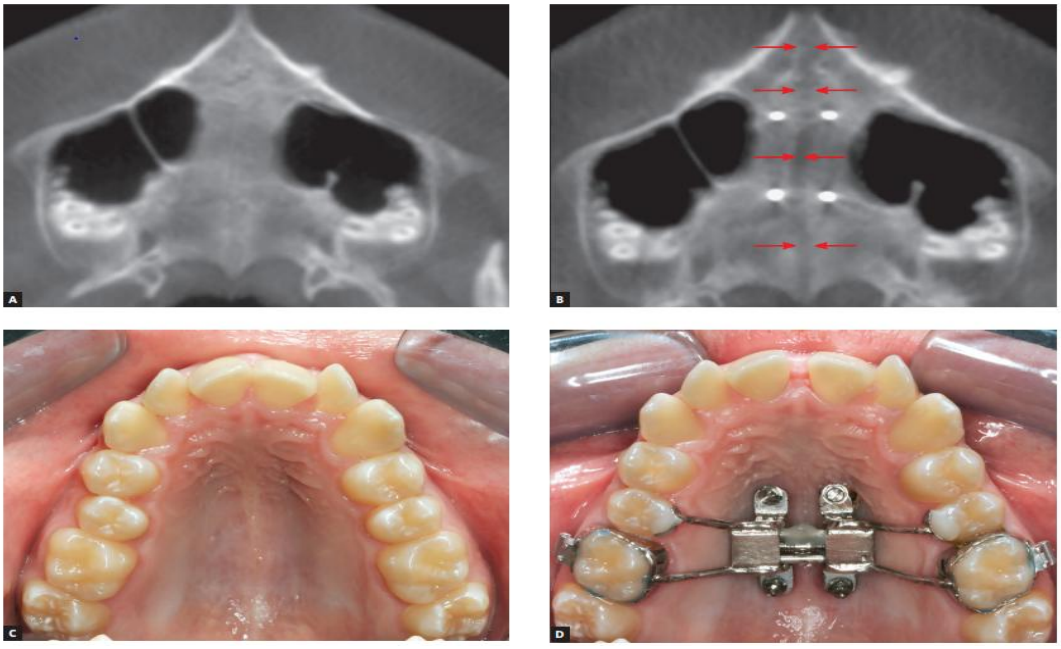

Figure 6 A, B) CBCT images on the axial section before after MARPE. Red arrows indicate the opening of the midpalatal suture C, D) Clinical photographs in occlusal view before and after MARPE, respectively[33]

Respiratory Airway Effects

Research describes that orthopedic correction by correcting the nasomaxillary deficiency also changes the abnormal pattern of breathing.[35] post-MARPE patients have a greater tendency towards nasal breathing thus likely changing the posture of the tongue and muscular dynamics, indirectly expanding the nasopharyngeal airway which further increases expiratory peak flow[34].

Nasal inspiratory peak flow, which is a nasal and oral obstruction indicator, may be enhanced instantaneously following expansion with stability that lasts up to 5 months[34].

The zygomatic arch is less expanded compared to the nasal cavity which supports increased nasal airflow bringing a positive influence on respiratory function and muscle strength.

The expansion of the airway volume was larger compared to conventional RME. Treatment by MARPE with effective growth increase in nasal cavity volume further enhances the stenosed airway and resistance in the upper airway, hence contributing towards the long-term stability of corrected malocclusion.

No perceived difference in improvement in oropharyngeal and hypopharyngeal airflow was seen in the literature.

Separation is accomplished in the nasal region and results in immediate alleviation of the airflow by opening the obstruction responsible for nasal air resistance, hence a mouthbreathers' help.

Benefits of MARPE

Duration of treatment is extremely minimal, one to four weeks of active expansion time, compared to other traditional expansion, 2-6 months of expansion time. MARPE independent of any anchor teeth units facilitates a concurrent fixed orthodontic treatment and expansion as an advantage. Maximal skeletal displacement with minimal dental tipping effects. Stable on treatment completion due to the fact that the maxillary posterior teeth are tipped buccally less compared to conventional expansion treatments.

Disadvantages of MARPE:

- •Forces exerted from greater distance to the implant-bone interface causes greater possibilities of MI deformation[27].
- •Success of treatment is prevented when MSE placement is attempted on a high arched narrow palate.
- •Unpredictable variability in craniofacial architecture and pattern of MPS calcification (greater resistance) are causative factors for MARPE failure.
- •Inclusion of Missing/compromised anchor units in traditional design MARPE application is a setback.
- MARPE provides stress distribution at the anchor teeth and zygomaticomaxillary process spreading along the lateral wall of the orbit, resulting in dizziness and tension on the bridge of the nose, eyes, and primarily all over the face. Thus in the case of highly/heavy sutural interdigitation and bony density increment, such people have to move to surgically assisted expansion.

In the event of numerous congenitally absent teeth an often combined with craniofacial deformities sutural expansion is challenging owing to loss of anchorage. The application of endosseous implants as abutments for sutural expansion would preclude undesirable tooth movement and could provide non-surgical treatment in situations with a dentally compromised patient.

Indications for MARPE

MARPE has an impact on respiration and also on the occlusion. The individual evaluation of both respiration and occlusion in most of patients reveal that both were supplementary to each other i.e. buccal cross bite are related with nasal resistance increase and mouth breathing.

According to Occlusion

- **Maxillary deficiency is Class III Cases:** MARPE is useful in the Class III malocclusions with maxillary deficiency and also with flattened mid third of the face, crowding of the maxillary arch and cross bite which may be either unilateral or bilateral and the teeth are usually inclined buccally.
- **Bilateral or severe unilateral expansion in class I cases:** Traditional methods of orthodontic treatment

require a long time for correction and relapse after treatment. Rapid expansion with MARPE adjusts the buccal segments' relationship within 3 weeks without seating the teeth in to an unfavorable relationship. There can be a proclination of the upper incisors in these and teeth must not be a part of the appliances. This permits them to relapse back to proper relationship with the lower teeth during the stabilizing period.

- Some Class 2 div 1 malocclusion cases in which there is a severe constriction of the upper arch accompanied by a unilateral or bilateral crossbite.
- **Chosen arch length discrepancy cases:** Borderline case with favorable facial patterns.
- **True maxillary deficiency case:** Those cases in which mandible is normal but under developed maxilla with straight profile in a midface area and are also related to crossbite.
- **Relative Maxillary deficiency case:** A case in which mandible is of larger size with normal maxilla:
- **Asymmetries of condylar position:** Skeletal response to MARPE redirects developing posterior teeth into normal occlusion and corrects asymmetries of condylar functional shifts and potential temporomandibular joint dysfunction.
- **Class II cases with mouth breathing:** Narrow nasal aperture literally filled by concha, deviated nasal septum, is common in these patients increasing the internasal capacity to allow nasal respiration.

Medical Indications:

- As a preliminary to septoplasty.
- Nocturnal enuresis: Sleep laboratory confirms the etiology of nocturnal enuresis owing to disrupted sleep patterns through obstruction, which is typically owing to an adenoidal hypertrophy or less frequently an anterior nasal stenosis. Regarding MARPE as a most successful procedure in early adult dentition, maxillary expansion in nocturnal enuresis cases of young adults is capable of reducing the adenoids within a few months.

Contraindications of MARPE

- A patient who exhibits soft tissue pathology in pressure bearing regions.
- Patient having high tendency for gingival enlargement like Dilantin hyperplasia.
- Patient having cover bite (maxillary teeth totally outside the mandible)
- Patient having normal buccal occlusion in lateral view.
- Patients who are unable to co-operate with the clinician.
- Patients with high antero-posterior and vertical skeletal discrepancies.
- Patient with cross bite of single teeth, anterior open bite, steep mandibular planes and convex profiles.
- •Patient with maxillary or mandibular skeletal asymmetry.

CONCLUSION

MARPE has been a successful and viable treatment for the correction of transverse maxillary deficiency with a high success rate and stability.

MARPE has been found to be more effective than traditional RPE and had also dominated SARPE as an acceptable and cost-effective option in appropriate cases.splint as part of the TMD treatment plan involving the specific patient’s requirements and needs, the patient’s values, and presentation.

Declaration by Authors

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