

MPA Reloaded

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ABSTRACT

Background: Fixed functional appliances are used mainly in noncompliant patients and also to make use of the circum pubertal growth spurt in patients with class II malocclusions with mandibular deficiency. The paper is about a case report of a 13-year-old girl, with class II division I malocclusion and mandibular deficiency, treated with a modified Mandibular Protraction Appliance type II. Modified MPA type II could be easily made by operator himself. The things required for fabrication of modified MPA type II include 20 gauge and 23-gauge stainless steel wires, silver solder material and blow torch. Maxillary unit consisted of TPA and wires on labial side connecting molar band with premolar band with a circular loop on the distal side of molar band, where one end of the push type coil is fixed. Mandibular unit consist of a lingual arch and wires on labial side connecting molar band with premolar band with a circular loop on the mesial side of premolar band. Other end of the push type assembly is inserted into this circular loop. Post treatment lateral cephalometric reading showed improvement of SNA, SNB, ANB, relationship of maxilla to cranial base, remodeling of condylar fossa, improvement in airway, improvement in soft tissue relationship and dentoalveolar relationships.

Keywords: Modified MPA type II, Class II division I malocclusion, Mandibular deficiency.

INTRODUCTION

There are several types of removable and fixed functional appliances for the correction of Class II Division 1 malocclusions with mandibular deficiency in order to stimulate mandibular growth by forward positioning the mandible. The selection of the appliance varies according to the clinicians' preference, type of the anomaly and growth pattern. As compared to removable functional appliances, fixed functional appliances do not require patient compliance and called noncompliance appliance.

The present case report shows the treatment of a patient with skeletal Class II malocclusion with mandibular retrusion using a modified version of MPA type II. Mandibular Protraction Appliance (MPA) is a fixed, dentofacial orthopedic noncompliant device that could be fabricated by the

clinician and permitted easy application to the patient.

APPLIANCE DESCRIPTION

- Mandibular Protraction Appliance was introduced by Coelho Filho in 1995. His inability to purchase some of the newer class II corrective appliances in northern Brazil led him to develop these group of appliance that reposition the mandible forward.
- They have proven effective in treating Class I patients with exaggerated over jet and Class II subdivision patients where only one side needs correction.

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- Their advantages include ease of fabrication, low cost, infrequent breakage, patient comfort, and rapid installation.
- But they are not claimed to be superior but are only treatment alternatives to Class II therapies.

INDICATIONS

- Late mixed / Early permanent malocclusions
- Growing patients in the pubertal period
- Upper molar distalization
- Asymmetric case
- Adult patients
- First molar extraction case

CONTRAINDICATIONS

- Deciduous and early mixed dentition due to lack of adequate dental support to resist heavy muscular force.
- Cases with excessive labial inclination.

APPLIANCE DESIGN

MPA TYPE I

- This appliance works quite simply; it slides distally along the mandibular arch wire and mesially along the maxillary arch wire upon opening and returns to rest against the mandibular arch wire stop and maxillary buccal tube on closing.
- However, to allow sufficient clearance for sliding along the mandibular wire, bicuspid bracket must be omitted and a buccal offset in the lower arch wire is often needed.

MPA TYPE II

- MPA type II is a fixed push type of appliance. It consisted of two pieces of 0.036" SS wire, each with a circular loop at one of its tips. After slipping one piece of coil into one of the components, the tip of each component was reciprocally inserted into the circular loop belonging to the other. The piece of coil placed between them was meant to prevent too much approximation of the two circular loops. With this configuration, each part could slide along the other without too much instability between them. Fig 1.

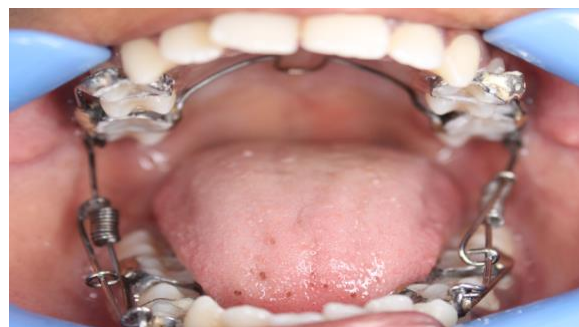


Fig 1: Appliance design

- The length of the appliance was equal to the distance measured from the mesial of the upper molar tube to a stop made in the lower arch wire mesial to the lower premolar and was capable of maintaining the patient in an incisor edge to edge position when mouth was closed.
- Here the design was modified with the addition of bands on all I molars and I premolars. Maxillary unit consisted of TPA and wires on labial side connecting molar band with premolar band with a circular loop on the distal side of molar band, where one end of the push type coil is fixed. Mandibular unit consist of a lingual arch and wires on labial side connecting molar band with premolar band with a circular loop on the mesial side of premolar band. Other end of the push type assembly is inserted into this circular loop.

ADVANTAGES

- Easily fabricated at chair side, with ordinary inexpensive wires.
- Do not require any special bands, crowns or wire attachments.
- No impression or wax bite registrations are needed.
- Easily inserted adjusted, removed and can be made and installed in about 30 minutes.
- Much smaller and thus more comfortable.
- Permit a greater range of motion and are less restrictive of movement

MPA TYPE III

- Many of the limitations of the first two MPA designs have been overcome with the development of the MPA No. 3.

- This version eliminates much of the arch wire stress and permits a greater range of jaw motion while keeping the mandible in a protruded position.

ADVANTAGES

- More comfortable for the patient.
- Offers greater range of motion.
- Equally simple and inexpensive but easier to place.
- Adaptable to either class II or class III cases.
- Can be used for mandibular positioning or Dento alveolar movement.
- Causes less breakage.

MPA TYPE IV

- The latest version, the MPA IV, is made up of the following parts
- T tube.
- Upper molar locking pin.
- Mandibular rod.
- Mandibular arch wire

This fourth version seems to be as efficient as its antecedents, but is much more practical to construct, easy to manipulate, and comfortable for the patient.

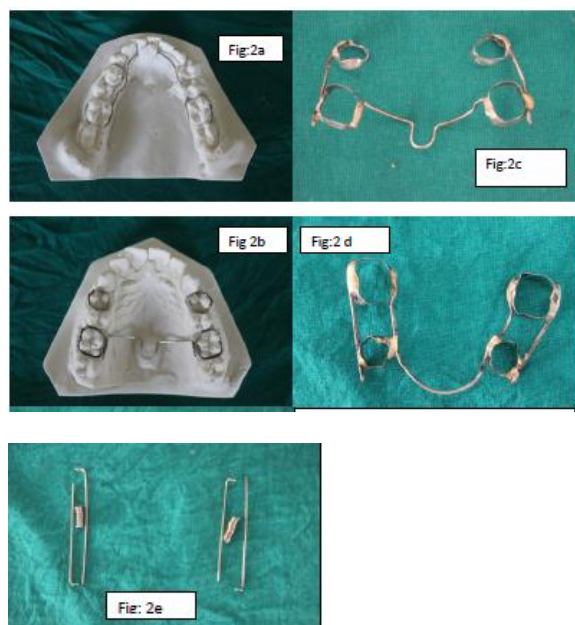


Fig 2a shows the lingual arch soldered to lower molar bands. Fig 2b shows the soldered TPA in upper arch with bands. Fig 2c shows the completed maxillary unit and Fig 2d shows the soldered

mandibular unit. Fig 2e shows the wire assembly which forms the push type part of appliance.

CASE REPORT

A 13-year-old female patient presented to our department with the chief complains of forwardly placed upper teeth. Pretreatment clinical examination showed that she had Class II Division I malocclusion associated with mandibular retrusion, increased overjet and irregular upper and lower teeth. The profile was convex. There was arch length deficiency of 3 mm in both maxillary and mandibular arch. (Fig 3)



Fig 3: Showing pretreatment photographs of the patient.

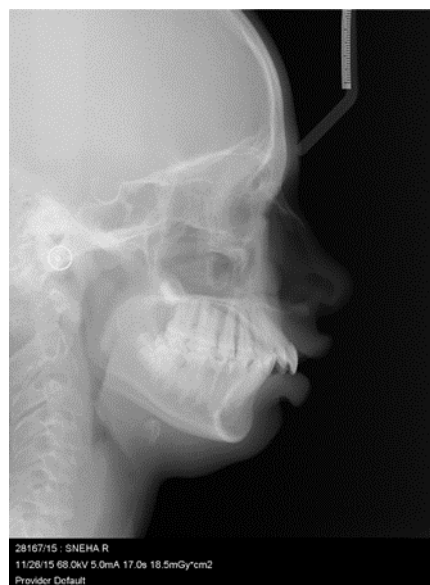


Fig 4: Pretreatment cephalogram of patient.

Examination of cephalometric radiograph revealed skeletal Class II malocclusion due to mandibular retrusion (SNA: 89°, SNB: 80° and ANB: 9°) and average vertical growth pattern (SN-GoGn: 30°)

[Table 1]. Panoramic radiograph revealed the presence of third molars in all quadrants.

The overall treatment objectives in this case were overjet reduction, achievement of a stable Class I molar and canine relation with coincident midlines and improvement of the soft tissue profile. The treatment was planned in two phases. Phase I consisting of correction of mandibular deficiency, molar relationship and overbite using a modified version of MPA type II and second phase consisting of intrusion of upper anteriors and alignment, attaining class I canine and correcting overjet and overbite.

First phase treatment involved treatment with the modified MPA for 9 months. After removal of appliance the molar relationship showed correction of class II molar to super class I, opening of bite and reduction in overjet. There was improvement in profile of patient.



Fig 5: MPA in place.



Fig 6: After MPA photographs.



Fig 7: After MPA cephalogram.

CEPHALOMETRIC TRACINGS

Cephalometric values showed decrease in SNA value to 87° , increase in SNB value to 81° , there was improvement in the relation of maxilla to cranial base, mandibular plane angle was increased. Although length of mandible didn't change after treatment, the change in position of Glenoid fossa was the cause of improvement in mandibular position. Airway showed considerable increase in width after treatment. Nasolabial angle showed improvement from 61° to 94° .

Superimposition of pre and after removal MPA showed remodeling of condylar fossa in anterior and inferior direction, distalization of maxillary molar and mesialization of mandibular molar, increase in mandibular incisal proclination.



Table 1: Composite Analysis.

MEASUREMENT	MEAN	PRE-TREATMENT	AFTER REMOVAL OF MPA
I. MAXILLA			
1. SNA	82 ± 2°	89	87
2. Na per to Pt A	±2 mm	4mm	3mm
3. Co to Pt A		81mm	79
II. MANDIBLE	80±2°		
1. SNB		80	81
2. Na per Pog	-2 to 2mm	-7mm	-4mm
3. Co-Gn		93mm	93
III. MAX-MAND RELATION			
1. ANB	2°	9°	6°
2. WITS		AO ahead by 4mm	0
3. McNAMARA diff		12mm	14mm

IV. VERTICAL			
1. FMA		25°	
1. FMA			29
2. SN to Go-Gn	31°	30	33
V. DENTAL			
1. U1 to N-A (angle)	22°	27	29
2. U1 to N-A (mm)	4mm	4mm	4mm
3. U1 to SN	102°	118°	116°
4. L1 to N-B (mm)	4mm	6mm	7mm
5. L1 to N-B (angle)	25°	30	33
6. L1 to A-Pog (mm)	1-2mm	1mm	3mm
7. L1 to A-Pog (angle)	22°	18°	16°
8. Interincisal angle	131°	115°	110°
9. IMPA	90°	95	96
VI. SOFT TISSUE			
1. E line to lower lip	-2 to 2mm	2mm	3mm
2. S line to upper lip	0mm	4mm	2mm
3. S line to lower lip	-2mm	4mm	4mm
4. Nasolabial angle	110°	61°	94°

The second phase has been started with fixed MBT appliances with 0.022-inch slots, intrusion with Burstone Intrusion arch and class II elastics planned in next stage.

CONCLUSION

Advantages of this modified MPA in addition to the advantages of fixed functional appliances are

1. Can be given without aligning teeth. This helps to maximum use of pubertal growth spurt.
2. Very cost effective. Operator can fabricate this appliance himself. All that is required is 20 gauge, 23 gauge stainless steel wires, and soldering material.
3. Midline shifts can be corrected. It is custom made for the patient. MPA can be activated with

different amount of force per side, with the objective of correcting skeletal midline shifts.

CONFLICTS OF INTEREST

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

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