International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Custom Made Mara Appliance (Mandibular Anterior Repositioning Appliance)

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ABSTRACT
The mandibular anterior repositioning appliance (MARA) is a tooth-borne functional appliance for use in patients with Class II malocclusions. So attempts have been made to make MARA appliance on the basis of easy accessibility of material and cost effective. MARA appliance has gained much popularity but it is available as preformed and very costly. There are very few labs which fabricate the same appliance so we tried to fabricate the appliance in our institute and case done with the same fabricated appliance and we were able to achieve results with the customized MARA more of Skeletal changes with minimal dentoalveolar changes. As the cost of MARA is 50,000 INR, its difficult to take advantage of MARA. So we thought of this popular functional appliance MARA to be fabricated in our institute and treat patients with the same appliance and observe its effectiveness with the help of lateral cephalograms and photographs.

Keyword: Class II, Custom Made MARA appliance

INTRODUCTION
Class II malocclusion is a prevalent form of orthodontic discrepancy that is commonly associated with mandibular retrognathia.[1] functional appliance refers to a variety of removable or fixed appliances designed to alter the mandibular position both sagittally and vertically, resulting in orthodontic and orthopedic changes.[2] Class II malocclusion, unlike what the Angle sagittal dental classification implies, is a multifactorial entity that involves a combination of one or more dental and skeletal factors.[3] The Herbst appliance has been considered the gold standard for a fixed functional appliance over the past half century.[3] Class II correction in orthodontic patients utilizing the Mandibular Anterior Repositioning Appliance (MARA).[3] Treatment of Class II malocclusions has varied with time and place.[3] The Mandibular Advancement Repositioning Appliance (MARA), a noncompliance device for Class II treatment, was first proposed by Eckhart and Toll in 1998.[4] The MARA is an alternative to the Herbst, with the major advantage being that it treats a Class II malocclusion in combination with comprehensive fixed appliances.[4] This may represent a favorable clinical feature in shortening treatment duration.[4] The MARA

differs from other noncompliance Class II devices such as the Forsus or Jasper Jumper because it is rigid and has no continuous upper arch–lower arch connection.[4]

The MARA as several advantages over the other noncompliance Class II appliances. These include:

- uncomplicated design – no inter-maxillary and mandibular connections. Sturdy and break resistant.
- aesthetically pleasing – no extra-oral headgear (decreased visibility).
- simple hygienic maintenance resulting in less oral mucosal infection/irritation.
- mandibular mobility is maintained – less functional movement impairment.
- fewer anchorage points resulting in less side-effects.

Although the MARA has been accepted as an effective non-compliance solution, it is not widely used due to the possibility of extra cost could play a role. So, here we have tried fabrication of MARA appliance in our institute and treated the patient with the same.

This case describes how innovatively and precisely MARA appliance can be customized .

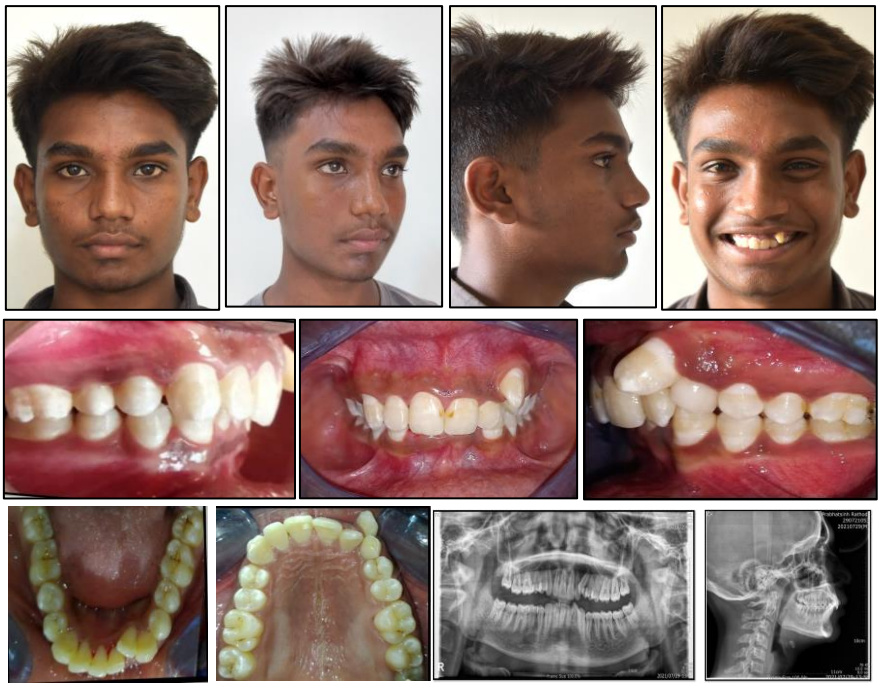
DIAGNOSIS AND TREATMENT PLANNING

A 15 year & 6 months old male patient presented with concern of upper placed tooth in left front region. Clinical examination shows convex facial profile, acute nasolabial angle, deep mentolabial sulcus, mesoprosopic facial form, Mesocephalic head shape and competent lips. Patient had Class II molar relation on both the sides on skeletal class II base, 2mm overjet & 6-7mm overbite with buccally placed upper left canine and deciduous canine was present on the same side, lingually placed lower left lateral incisor with average facial growth pattern and midline shifted to right side.

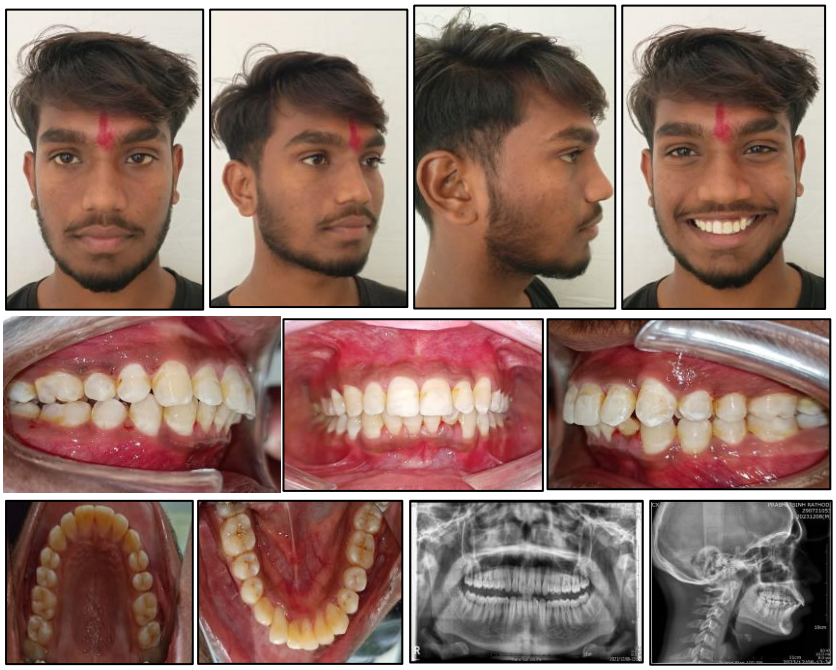
	Norm	Pre treatment	Post treatment
SNA	82º	81º	80º
SNB	80º	75º	78º
ANB	2º	6º	2º
Wits Appraisal	-2 to 4 mm	+5mm	3 mm
SN-MP	32º	32º	31º
FH-MP	22º	21º	20º
U1-SN	102º	105º	100º
U1-NA	22º	30º	22º
IMPA	90º	107º	102º
L1-NB	25º	33º	29º
U1-L1	131º	114º	125º
Articular angle	143º±6º	142º	149º
Saddle angle	123º±5º	127º	122º
Gonial angle	128º±7º	134º	130º
Mandibular length		112mm	115mm

Table 1 Cephalometric Analyses

Lateral cepalometric analysis (Table 1) revealed a skeletal class I (ANB = 6º) with an average growth pattern (SN-MP = 32º. The upper incisor & lower incisor were proclined (U1-SN = 105º IMPA = 107º)



Pre-treatment Photographs



Post- treatment Photographs

TREATMENT PROGRESS

Firstly, deciduous canine was extracted . MARA appliance was fabricated and delivered at our institute which is described later. After 2 months, upper bonding was done including upper left canine as which is highly buccally placed and continuous 0.012" Niti wire was ligated followed by 0.014" Niti, 0.016 Niti and 0.016"x0.022" Niti wire. After total of 5 months, upper 0.018" SS wire was ligated and MARA component increment has been done. Lower bonding was done & the same wire sequence was followed. After that 0.018 SS was ligated piggy bag technique was followed with 0.012" Niti wire as the auxillary

wire for the correction of lateral incisors. The mandibular archwire was consistently cinched back distal to the molars and a unit was created from molar to molar in both the arches to avoid opening up of any spaces.

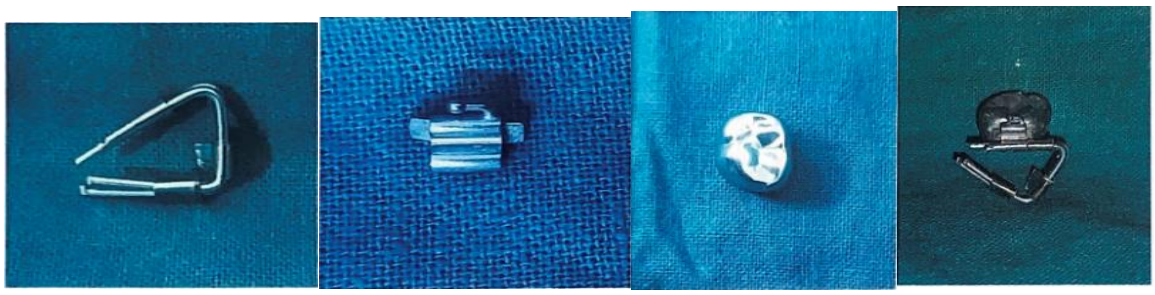
TREATMENT RESULTS

As we can see the Table 1 post treatment cephalometric analysis , there are skeletal and dentoalveolar changes. Skeletal parameters shows the forward positioning of mandible. There are changes in the skeletal parameters like SNB, ANB, WITS APPRAISAL, ARTICULAR ANGLE, SADDLE ANGLE, GONIAL ANGLE & MANDIBULAR LENGTH. As we can compare the cephalometric analysis (Table 1) pretreatment and post treatment , there are changes in the dentoalveolar parameters like U1-SN, U1-NA, IMPA,L1-NB,U1-L1.

APPLIANCE DESIGN

1. Maxillary part

- After clinical examination, pedo SS crown were selected.
- First SS crowns were cemented on both the upper first molars with molar tubes and lingual sheath soldered to it.
- A 16 guage round SS wire was straightened and 60 degree bend given at 15mm and another 60 degree bend given at 10mm.
- Now two 16 guage SS wire combined by 150x005 band material.
- These band materials were properly welded to combine the wires properly to make an ELBOW.
- A sheen was prepared from 150x005 band material so that the elbow is secured in position.
- The prepared elbow inserted into the molar tube.
- Now, this procedure is repeated on the opposite side.



2. Mandibular part

After clinical examination, pedo SS crown were selected.

- Lower arm was prepared with round 0.16 SS wire.
- 150x005 band material was welded on the front portion of the lower arm.
- Then the lower arm was soldered to lower SS crown.
- The crown was cemented onto the molars.
- Now, same procedure is repeated on the opposite side.

DISCUSSION

The pubertal growth spurt, according to literature and previous clinical studies, is the most ideal time to treat Class II malocclusions resulting from mandibular deficiencies, because the growth of the jaw of the patient could be utilized and manipulate. Some of the changes observed in this study included a small degree of restriction of maxillary growth, the mesial movement of mandibular molars, pre-molars and incisors and the distalization of maxillary molars and premolars – the so-called "head gear effect". The glenoid fossa and mandibular condyles may also undergo remodeling as the mandibular condyles rest in their newly advanced position on the articular eminence of the temporal bone. Proffit et al. state that the remodeling is facilitated by two phenomena; the reduced pressure on the condylar tissues accompanied by a change in the muscle tension acting on the condyle. The MARA was introduced with the intention of creating an equally effective appliance without the associated problems that seemed to develop from use of the Herbst appliance. Advocates of functional appliances cite stimulation of mandibular growth caused by forward positioning of the mandible. The lack of success with functional appliance treatment has been attributed to a lack of patient compliance and the inability to control the amount and direction of mandibular growth. One of the few fixed functional appliances that eliminate this compliance factor is the mandibular anterior repositioning appliance (MARA). This device can be used concomitantly with full fixed appliances while the skeletal correction is being achieved. As, we all know MARA has gain so much popularity as fixed functional but due to its cost factor, it was inconvenient for the patients, so we have decided to fabricate the popular appliance in our institute and evaluate its results, and surprisingly we had achieved maximum of Skeletal changes with minimal Dentoalveolar changes. For this, we has treated patient with the own fabricated MARA appliance in our institute. This was becoming essential to pay attention on this popular appliance but at the same time on its cost. They available in prefabricated form in the markets but its cost is around 50,000 Rs. So, this made us pay attention, and made us to creatively think about its alternative. But why to think other alternative if we already have wonderful orthodontic material and we can make use of it. As we all know, orthodontics is all about fundamental biomechanics and customization. So, here is the idea of fabrication of MARA with the basic orthodontic material which are easily available and cost effective, in addition to that we got the skeletal changes. Here the case is discussed which was treated by the same appliance and we got the results. Here, in the above case we have observed several changes both skeletal as well as dentoalveolar changes. There were changes in the mandible positioning like SNB was 75º and after the appliance it is now 78º which shows forward positioning of mandible. There are other skeletal parameters which shows forward positioning of mandible like there was increase in articular angle and decrease in saddle and gonial angle. There was increase in mandibular length. There are changes in axial inclination in upper and lower incisors as well as changes in interincisal angle. With this cost effective and customized MARA

we were able to achieve Skeletal changes with minimal dentoalveolar changes.so, we are happy to discuss the customized and popular appliance which is cost effective and give results.

DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

FINANCIAL SUPPORT AND SPONSORSHIP

Nil..

CONFLICTS OF INTEREST

There are no conflicts of interest.

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