

# The MARA Appliance

By Dr. Brock Rondeau, *Diplomate International Board of Orthodontics*

**T**he MARA appliance is ideally suited to correct Class II skeletal malocclusions, normal maxillae, retrognathic mandibles, large overjets, deep overbites in patients over age 11. Since the MARA appliance is worn 24 hours per day for 7-10 months, it is not dependent on patient cooperation for success. Patients and parents love the MARA appliance since it corrects the skeletal malocclusion in a short period of time without the need to extract permanent teeth or to surgically move the lower jaw forward at age 17.

One of the most common malocclusions affecting Caucasian patients is the Class II skeletal malocclusion where the patient presents with a normally positioned maxilla and a retrognathic mandible, a constricted maxillary arch and a large overjet. Dr. James McNamara and the late Dr. Robert Moyers reported that in excess of 80% of these Class II skeletal malocclusions need to have some type of functional jaw orthopedic appliance to move the lower jaw forward.

One of the most popular functional jaw repositioning appliances is the Twin Block Appliance, developed over 40 years ago by Dr. William Clark, an orthodontist from Fife, Scotland. The Twin Block is ideal for younger patients (under age 11).<sup>1</sup> The treatment objective for children should be to correct the Class II skeletal problem in the mixed dentition if possible. This correction of Class II skeletal to Class I skeletal can ideally be done using jaw repositioning

appliances. Functional appliances correct skeletal problems and orthodontic braces correct dental problems (crooked teeth, spaces, etc). One of the main disadvantages of the Twin Block appliance is that it is removable. Therefore, cooperation could be a problem. The advantage of the MARA appliance is that it is fixed and the success rate is much higher when this orthopedic jaw repositioning appliance is worn all the time.

The MARA appliance (Mandibular Advancement Repositioning Appliance) was developed in 1990 by Dr. Douglas Toll, orthodontist, Germany, and Dr. James Eckhart, orthodontist, Manhattan Beach, California.<sup>2</sup> The objective of the use of the MARA appliance is to relate the mandible to the maxilla correctly in three dimensions; transversely, anteroposteriorly, and vertically.

## Indications

Class II, Div 1 skeletal malocclusion

Normal maxilla

Retrognathic mandible

Over age 11

Overjet 5 mm or more

Horizontal growth pattern

## Fabrication

Place separators mesial and distal upper and lower first molars seven days prior to appointment for impressions or digital scans Remove posterior separators

Upper and lower alginate impressions (Kromopan) or digital scans

Two yellow stone working models

Scan upper and lower arches and send scans to orthodontic lab

Advance mandible 4-5 mm.

Polyvinylsiloxane bite registration

Place separators mesial and distal to upper and lower first molars

Make an appointment for two weeks to insert appliance



**MARA APPLIANCE**  
**Mandibular Anterior Repositioning Appliance**

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## BROCK RONDEAU

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## Course Objective & Content

The purpose of this comprehensive program is to teach general and pediatric dentists how to diagnose and treat simple orthodontic cases. Emphasis will be placed on thorough records and diagnosis. Treatment will involve using a combination of functional appliances, mainly in mixed dentition and fixed orthodontic braces (straight wire technique) in permanent dentition. Dr. Rondeau's systematic approach, organization and marketing tips make incorporating orthodontics into the general practice relatively easy.

**Session 1.** Early Treatment Mixed Dentition, Functional Appliances, Diagnostic Records, Cephalometrics, Practice Management

**Session 2.** Straight Wire Mechanics, Class II Treatment, Twin Block™, Rick-A-Nator™, Carriere Motion 2, Bracketing, Banding of Molars, Archwires

**Session 3.** TMJ in Orthodontics, Sagittal & Tandem Appliance, Class III, Splint Therapy, Joint Vibration Analysis, Carriere Motion Appliance 3, Myofunctional Appliances

**Session 4.** MARA™ Appliance, Open Bite Cases, Impacted Cuspids, Clear Braces, Case Finishing, Retention, Snoring & Sleep Apnea, Clear Aligners, Molar Distalization

## Course Dates & Locations

### Vancouver, BC

Session 1 ..... April 14 & 15, 2023

Session 2 ..... June 9 & 10, 2023

Session 3 ..... September 29 & 30, 2023

Session 4 ..... October 27 & 28, 2023

### Chicago, IL

Session 1 ..... September 15 & 16, 2023

Session 2 ..... November 10 & 11, 2023

Session 3 ..... January 19 & 20, 2024

Session 4 ..... March 22 & 23, 2024

### Toronto, ON

Session 1 ..... September 22 & 23, 2023

Session 2 ..... November 17 & 18, 2023

Session 3 ..... January 12 & 13, 2024

Session 4 ..... March 1 & 2, 2024

### Dallas, TX

Session 1 ..... October 13 & 14, 2023

Session 2 ..... December 1 & 2, 2023

Session 3 ..... February 16 & 17, 2024

Session 4 ..... April 5 & 6, 2024

### Newark, NJ

Session 1 ..... February 9 & 10, 2024

Session 2 ..... April 12 & 13, 2024

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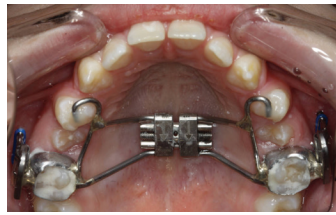
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**MARA appliance consists of two parts:**



**Upper Part MARA**  
**Stainless Steel Crowns**  
**Mesial Rests Bicuspid**  
**Midline Hyrax Screw**  
**Buccal elbows first molars**



**Upper Part MARA**  
**Hyrax Screw**  
**Mesial Rests**  
**Flowable Composite**  
**Buccal elbows first molars**



**Lower Part MARA**  
**Lingual Arch**  
**Lingual rests cuspids**  
**Buccal arms first molars**



**Lower Part MARA**  
**Blue Bisfil**  
**Composite lower molars**  
**Lingual rests cuspids**

## Upper Part MARA Appliance

- Two stainless steel crowns are fitted for the upper first molars. The crowns are micro-etched to increase retention. The lab only has a limited number of stainless steel crowns compared to molar bands. Therefore the fit of the stainless steel crowns is not as precise as stainless steel molar bands. Ask the lab to remove the occlusal surface of the stainless steel crowns. This prevents large posterior open bite, possible traumatic occlusion and TMJ problems. Removal of the occlusal surface of the stainless steel crowns makes it much easier to remove them at the end of treatment.
- Buccal tubes (.062") are soldered to the buccal of the upper stainless steel crowns.
- Buccal elbows are inserted into the mesial of the buccal tubes of the upper first permanent molars. Buccal elbow is attached to buccal tubes on stainless steel crowns with stainless steel ligature tie. Over top of the stainless steel ligature tie, place a posterior separator to make it more comfortable for the patient.
- Mesial rests are placed on first bicuspid. Add flowable composite for increased retention. These mesial rests prevent the anterior part of the MARA impinging on the gingival tissue.

## Hyrax Screw

The majority of Class II skeletal malocclusions with normally positioned maxillae and retrognathic mandibles with a large overjet have a constricted maxillary arch. The midline Hyrax screw is routinely used to develop the narrow arch to normal. If the upper arch is severely constricted and needs 10 mm. of expansion then I recommend that the patient start with an upper Banded Hyrax appliance prior to the MARA appliance. If the upper arch only needs 4 mm expansion or less then place a Hyrax Screw on the upper part of the MARA.

## Lower Part MARA Appliance

- The lab fits the two stainless steel crowns on the lower first molars.
- Ask the lab to remove the occlusal surface of S.S. Crowns.
- Buccal arms soldered to the buccal of the stainless steel crowns function with the buccal elbows on the upper part of the MARA appliance to reposition the mandible forward.
- The lower lingual arch is soldered to the lingual of the lower stainless steel crowns on the lower first molars.
- Lingual arch contacts the lingual of the lower first molars, bicuspid, cuspids and incisors. This helps prevent mesial and lingual movement of the lower first molars when the upper elbow and lower buccal arms contact.
- Lingual rests are attached to lower cuspids with flowable composite to assist with retention and anchorage.

## Adjustments MARA Appliance

The initial advancement with the MARA is 4-5 mm. If the overjet is more than 4-5 mm then every 2 months add 2 mm shims to the horizontal leg of the upper buccal elbows. After adding the Shims the buccal elbows are attached to the buccal tubes with stainless steel ligature ties and posterior separators.



**Upper buccal elbow with 2 mm shim**

**Posterior separator**



One of the most important considerations is that the maxillary arch must be properly developed so that the maxillary first molars are buccal to the mandibular first molars otherwise the buccal elbows will hit the lower posterior teeth. If the maxillary first molars are mesially rotated, the buccal elbows will not function properly with the buccal arms on the lower first molars. This mesial rotation will have to be corrected with straight wire prior to the MARA appliance.

## Posterior Open Bite

Class II skeletal patients with normally positioned maxilla and retrognathic mandibles, large overjets and deep overbites will routinely have posterior open bites in the area of the bicuspsids when the lower jaw is advanced with the MARA appliance. This unstable bite is bad for the health of the TMJ and makes it difficult for the patients to chew properly.

## Solution

1. Build up the lower first molars with composite. The first step to help correct the posterior open bite would be to build up the occlusal surface of the lower first molars with composite to help stabilize the TMJ.
2. If the space between the bicuspsids is 3 mm. or less then add composite to the occlusal surface of the lower first and second bicuspsids. Gradually the composite can be removed from the first bicuspid which then can be erupted with vertical elastics. During the support phase following the MARA appliance, the composite could be removed from the second bicuspid which then could be erupted with vertical elastics.



Age 10 : Buck Teeth



Deep Overbite 8 mm



Overjet 9 mm  
Overbite 8 mm



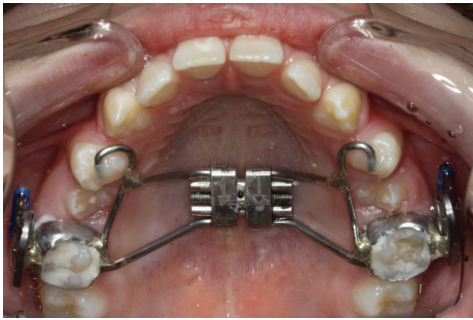
Retrognathic Profile



MARA Appliance



Arm in front of elbow



**Upper Part MARA**  
**S.S. Crowns First**  
**Molarmesial**  
**Rests**  
**First Bicuspids**  
**Buccal Elbow**  
**Midline Screw**



**Lower Part MARA**  
**S.S. Crowns First**  
**Molar**  
**Lingual Rests**  
**Cuspids**  
**Lingual Arch**  
**Buccal Arms**  
**Blue Composite**  
**First Molars**



**Overjet 9 mm**  
**Overbite 8 mm**



**Overjet 1 mm**  
**Overbite 2 mm**



**Deep Overbite**  
**8mm**



**Straight Teeth**



**Retrognathic**  
**Profile**



**Straight Profile**



**Age 10 :**  
**Buck Teeth**



**Age 16 :**  
**Teenage Model,**  
**New Smile**

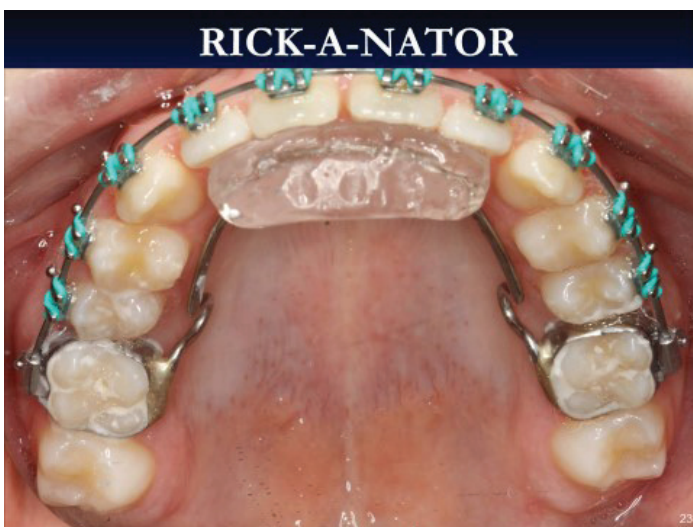


## Support Phase

Following treatment with the MARA appliance which could last 7-10 months, there must be a support phase which lasts 6-9 months to help hold the repositioned mandible forward and prevent a relapse. The key for the support phase is to hold the mandible forward with an appliance with an upper anterior incisal ramp, and also to stabilize the bite and TMJ by erupting the lower molars and bicuspid. The eruption of the lower posterior teeth is the treatment of choice for patients who are skeletally overclosed, and have short lower face height with deep overbites. This increase in the posterior vertical dimension is often beneficial to help reduce TMJ signs and symptoms by moving the condyle down and forward away from the nerves and blood vessels in the bilaminar zone.

During the support phase the patient wears vertical elastics to erupt the lower bicuspid and molars to close the posterior open bite created when the MARA appliance moved the mandible forward.

## RICK-A-NATOR



**Molar bands**  
**Two .045 Connector Wires**  
**Molar bands to incisal ramp**  
**Incisal ramp**

It is essential that then Rick-A-Nator be worn for a period of 6 months after the MARA Appliance. The patient is instructed to occlude in front of the incisal ramp which helps prevent relapse. The Rick-A-Nator is a fixed appliance which helps correct the overjet and the overbite. The appliance is very compact and the cooperation is excellent since it is a fixed appliance and the patient has no trouble speaking with the appliance. Another advantage of the Rick-A-Nator is that it can be worn with straight wire which significantly shortens the treatment time.

## TMJ Dysfunction

Most Class II skeletal patients with retrognathic mandibles, large overjets and deep overbites have or eventually will have several signs and symptoms of temporomandibular dysfunction (TMD). Tomogram or CBCT scan (x-rays of temporomandibular joints) reveal that the condyles are posteriorly displaced which compresses the nerves and blood vessels distal to the condyle. Signs of TMJ Dysfunction include limited range of motion interincisally, limited movement to the right or to the left, deviation or deflection on opening and limited protrusive movement. Other signs of TMJ Dysfunction would be painful response of the muscles of the head and neck upon palpation.

Symptoms of TMJ Dysfunction include headaches, neck aches, sore shoulders, back pain, dizziness, tinnitus, ear congestion and stuffiness, ear pain, dizziness, fainting and pain behind the eye. When the condyles are posteriorly displaced the discs are frequently anteriorly or anteromedially displaced. This is easily diagnosed by observing the clicking when the patient opens and closes. Many clinicians who treat patients with TMJ Dysfunction have an objective diagnostic tool known as the JVA (Joint Vibration Analysis) which allows the clinician to diagnose exactly what is occurring in each TM joint. Most patients are in Stage 2 of internal derangement and the patient is clicking, has intermittent locking and has pain. Several research papers have demonstrated that the anteriorly displaced discs can be recaptured using an anterior repositioning appliance such as a MARA appliance. Dr. Clifton Simmons stated that when the anteriorly displaced disc can be recaptured this reduces the TMD symptoms by 94%.<sup>3</sup>

## Advantages Of The MARA Appliance

1. Significant improvement in profile. Pre-treatment retrognathic profile. Post treatment straight profile
2. Correction of the overjet.
3. Correction of the overbite.
4. Class II skeletal to Class I skeletal.
5. Class II molar to Class I molar.
6. Class II cuspid to Class I cuspid
7. Advancement of the mandible increases size of pharyngeal airway.<sup>4</sup>
8. Correct function relates the mandible to the maxilla in three dimensions, transversely, anterior posteriorly and vertically.
9. Successful treatment of patients in Stage 2 of internal derangement (TMD) permanently.
10. When the mandible advances it also moves the tongue forward which reduces the incidence of snoring and life-threatening obstructive sleep apnea.<sup>5</sup>

## Conclusion

The MARA Appliance is an extremely important appliance to be used in the treatment of patients with Class II skeletal malocclusions with large overjets, deep overbites, retrognathic mandibles. The ideal age is after age 11 when the first molars have erupted and the roots are completely formed. The MARA Appliance is a fixed functional appliance which virtually guarantees success because the appliance is worn 24 hours per day and is not dependent on patient cooperation.

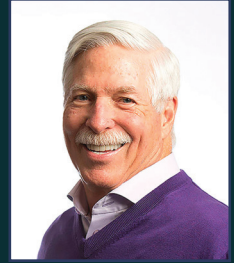
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Dr. Rondeau has been treating children's orthodontic orthopedic problems for over 35 years and has taught over 24,000 dentists worldwide.

He recommends early orthodontic treatment for children utilizing a functional philosophy which is a non-extraction, non-surgical approach. By developing the arches with functional appliances he avoids the extraction of permanent teeth. He utilizes functional appliances to reposition the lower jaw forward which prevents orthognathic surgery and future TMJ and snoring and sleep apnea problems.

Treatment must be implemented to prevent children from mouthbreathing which causes malocclusions and many health problems such as ADHD, aggressive behaviour, poor marks in school, bedwetting, bruxism, snoring and sleep apnea.

Since 75% of children and adults have a malocclusion general dentists need to take courses in order to treat them. Parents are looking for general dentists to help not only improve the appearance of their children but also increase their overall health by creating beautiful, broad smiles, patent airways and healthy TM joints.



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